AIR FORCE PAMPHLET 10-219, VOLUME 1
1 DECEMBER 1995

Operations

CONTINGENCY AND DISASTER PLANNING

DEPARTMENT OF THE AIR FORCE

AIR FORCE PAMPHLET 10-219, VOLUME 1
Inside Cover

FOREWORD

Air Force Civil Engineers have a big, exciting, and important job--supporting US Air Force operations anytime, anywhere, and in all conditions. This pamphlet is the first in a series to help today's civil engineers prepare for tomorrow's crises. Because our past has shaped our present-day doctrine and capabilities, this volume opens with a short historical account of Air Force Civil Engineers. It is a heritage we can all be proud of, even as we add to it.

The volumes in this series blend new information with updated lessons of the past. These "how to" pamphlets are written specifically to help unit-level civil engineers respond to contingencies: natural disasters, accidents, war, and humanitarian support. This first volume guides you through the contingency planning you need to do. It sets the tone for the series and tells you where to find additional information you may need.

The volumes are written with our junior officers in mind, but every civil engineer officer, senior NCO, and enlisted person should be familiar with the information in them. When you deploy, take these pamphlets with your team as a mini-technical library.

- Volume 1, *Contingency and Disaster Planning*
- Volume 2, *Preattack and Predisaster Preparations*
- Volume 3, *Base Recovery*
- Volume 4, *Rapid Runway Repairs*
- Volume 5, *Bare Base Conceptual Planning Guide*
- Volume 6, *Planning and Design of Contingency Air Bases*
- Volume 7, *Expedient Construction Methods*
- Volume 8, *Prime BEEF Manager's Guide*
- Volume 9, *Establishing and Maintaining Contingency Air Bases*

These pamphlets contain invaluable, detailed information. The common-sense guides offer solutions to problems you may someday face. They may not answer all the questions you will have, but they give you a place to start. These guides are written to help you. If they do not or you need additional information, tell us.

With well-placed confidence, I know you have the ingenuity and resourcefulness to continue providing top quality support to the best Air Force in the world.

JAMES E. McCARTHY, Major General, USAF
The Civil Engineer

BY ORDER OF THE
SECRETARY OF THE AIR FORCE

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This pamphlet presents a brief history of Air Force Civil Engineers and discusses contingencies for which civil engineers must be prepared. It contains practical information to help unit-level civil engineers plan their responses to contingencies, disasters, war, and other military operations. It explains how to identify requirements and get resources; to organize civil engineer response teams; and to train and exercise those teams. The pamphlet supports AFI 10-210, *Prime Base Engineer Emergency Force Program* and AFI 10-211, *Civil Engineer Contingency Response Planning*. Send comments and suggested improvements on AF Form 847, Recommendation for Change of Publication, to HQ AFCESA/CEX, 139 Barnes Drive, Tyndall AFB FL 32403-5319.

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Page

Figures

Page

Tables

Page

Attachments

Chapter 1

OUR FOUNDATIONS: A HISTORY OF AIR FORCE CIVIL ENGINEERS

1.1. A Proud Heritage. Air Force Civil Engineers have a proud heritage tracing back to before World War I. Originally, the engineering function was a small unit of the Army Signal Corps and construction was handled through the Office of the Chief Signal Officer. When the Air Service was established in 1918, the Building and Grounds Branch of the Division of Military Aeronautics inherited maintenance and construction responsibilities (in conjunction with the Construction Division of the War Department) for ten flying schools, one repair depot, and five balloon schools. In 1921, construction of Air Service projects was turned over to the Construction Service, Quartermaster Corps, working closely with the Air Service (later Air Corps) Building and Grounds office.

Throughout the 1930s, the Air Corps continued to slowly expand. The availability of Works Progress Administration funds facilitated construction that otherwise would not have been undertaken by the Air Corps. In 1940, construction of Army Air Corps facilities in the Zone of Interior (the Continental United States) was transferred to the Corps of Engineers. For construction overseas, a new type of engineering organization was established.

1.2. World War II. Long before Pearl Harbor, the growing Army Air Forces indicated the vital need for engineers specialized in the building of airfields overseas in support of tactical and strategic air operations. The Air Forces needed their own engineers; troops who trained with it, spoke its language and understood its needs. These men were to be trained and equipped to rapidly construct advanced airfields close to or even behind enemy lines. They were also to be trained to improve and maintain the existing facilities. They were to be skilled in the camouflage of airfields and the construction of defensive works. They were to be organized and prepared to repair airfields damaged by enemy bombing. Finally, with their trained riflemen and machine gunners, they were to be prepared to take an active part in the defense of their airdromes. Such was the concept of the Aviation Engineers--troops who were trained to construct, conceal, maintain, and defend airfields.

1.2.1. In June 1940, a handful of officers and 80 enlisted men assembled at Fort Benning, Georgia, to form the 21st Engineer (Aviation) Regiment, the first of its kind and the parent unit of the more than 100,000 Aviation Engineers who served in WWII. Originally established with 27 engineer officers and 761 enlisted men, each aviation engineer battalion was programmed for a lavish amount of equipment, including 220 items for construction and 146 vehicles--diesel tractors with bulldozers, carryall scrapers, graders, gasoline shovels, rollers, mixers, air compressors, drills, trucks, trailers, asphalting and concreting equipment, rock crushers, draglines, and pumps--for its mission. To protect themselves from air and ground attack, the Aviation Engineers were trained and equipped for combat as well as construction. They were armed with a variety of weapons including bazookas, antitank and antiaircraft guns, grenade launchers, armed half-tracks, antitank mines and a full complement of small arms.

1.2.2. In addition to the regular aviation engineer battalions, airborne battalions were conceived in early 1942 for mobile use in an invasion. Sixteen airborne aviation engineer battalions were organized in 1943, each with a complement of 28 officers and 500 men and light equipment such as miniature tractors, scrapers, rollers, a supply of weapons, and radio equipment. These specialized units were designed to parachute into enemy territory, to establish an emergency strip, and, with light equipment landed by gliders, to improve the runway until it could accommodate transports and tactical planes (figure 1.1).

Figure 1.1. Miniature Dozer Used by Airborne Aviation Engineers.

1.2.3. One of their successful operations occurred in North Africa. Major General James H. Doolittle, Commander, 12th Air Force, needed a dry base close to the front for his heavy bombers. Brigadier General Donald A. Davison, Chief Engineer, Allied Forces, found a large sandy expanse near Biskra, deep in the Sahara. Because the conventional battalions were already busy on other projects, he called in the airborne engineers. Troop transport planes carried the engineers and their specially designed miniature equipment to Biskra, almost a thousand miles. They arrived on the evening of 13 December and began work immediately. Twenty-four hours later, the first B-17 arrived from Oran. The bombers were out of the mud and used the base until the following March, when spring winds blew sand in such quantities as to make operations impossible. The airborne engineers also functioned as smoothly and as efficiently as in a textbook exercise under conditions impossible for a standard battalion in Burma and at Tsili Tsili in New Guinea. But, in general, their equipment was too light and the whole concept of their purpose was too specialized for general use. Theater commanders greatly preferred the standard battalion, and the airborne units sometimes sat idle or were used in routine small jobs; eventually, many of them were either merged with other units or given normal size equipment and fought as standard battalions. The successes showed that there was some need for the airborne engineer unit but certainly not in the numbers which were formed.

1.2.4. Immediately following the American entry into the war, aviation engineer units were sent to England to help service support engineers prepare bases for the scores of planes which would soon follow. The Aviation Engineers first saw action in the deserts of North Africa. Four battalions stationed in England (809th, 814th, 815th, and 817th) accompanied the initial assault forces at Oran, Morocco.

1.2.5. The battalions landed without incident and usually without their equipment. The men of the 814th walked 12 miles to their project site only to fill in holes, dig up duds, and remain idle because their heavy equipment had been appropriated by another unit after being unloaded. The ship carrying the 815th's equipment was sunk and the 809th's equipment was on a ship that had developed engine trouble 2 days out of England and turned back.

1.2.6. When the units finally began their work in earnest, the major obstacle to constructing airfields along the coasts of North Africa was not the Germans or even the Italians, but "General Mud." The engineers had landed during the rainy season. General Davison described the construction of the airdrome at Tafaraoui, "To any aviation engineer in North Africa, the word Tafaraoui does not mean an airport alone, it means also a malignant quality of mud; something like wet concrete and of bottomless depth. We still speak of any bad type of mud as Tafaraoui."

1.2.7. Through active planning and cooperation between engineer and planner, the Aviation Engineers were almost always at the front lines, or sometimes even ahead of them. One night General Davison was looking for the engineers of "B" company, 814th Battalion, when he was stopped by sentries from the 1st Armored Division, *"They stopped me and asked me if I knew I was going out in front of their patrols. I said, 'No that I didn't know that but I wanted to ask them one question--had a certain engineer company gone through and were they out in front?' and they said 'Yes, if you mean those damn fools who wouldn't pay any attention to us and took those big machines out, we think they are about 10 or 15 miles down the road.' and I said, 'That was what I wanted to know.' I found "B" company dug in with its defensive weapons in place and already at work. It was by keeping in touch with the planning . . . that we were able to do this."*

1.2.8. The base at Bone, the easternmost port available to the Allies, was perhaps the most difficult but probably the most rewarding to build. The only possible site for the all-weather airfield was a delta in the Seybouse River mouth. But the area was pure mud. The solution was to use sand available along the coast. Unfortunately, the sand dunes were on the opposite side of the river from the construction site. The men constructed a causeway across the river, a roadway on the delta, and began to bring in sand from the dunes. Although the site was under Axis air attack, rain was the enemy the engineers feared most. A rare dry spell allowed the engineers to bring the sand across and finish the runway just hours before rain washed away the causeway.

1.2.9. Shortly after completing the runway at Bone, the engineers received the most gratifying of rewards. A B-26 returning from a mission had become lost and was about to run out of fuel. While headed for a ditching in the Mediterranean Sea, the pilot happened to glance down and see the *"longest runway he had seen in North Africa"* at Bone. He made one sharp turn and landed without enough gas left to taxi his plane off the runway (figure 1.2).

1.2.10. The Aviation Engineers proved themselves in North Africa. By the end of the campaign the ten battalions in theater had built or improved 129 airdromes. General Carl Spaatz, commander of the Northwest African Air Forces, stated, *"the Aviation Engineers have become as nearly indispensable to the Army Air Force as is possible to ascribe to any single branch thereof."*

1.2.11. The close working relationship forged between the engineers and the fliers in North Africa continued in Sicily and Italy and was a key to the Allies' success on the European continent.

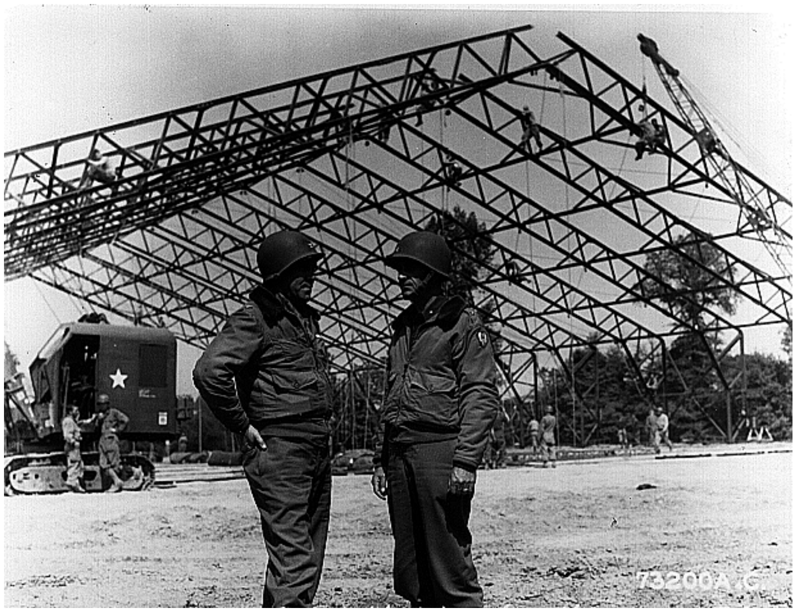
Figure 1.2. Bomber Landing on Completed Airstrip.

1.2.12. In the Sicilian campaign, the task of the AAF engineers was to provide airstrips in support of the US Seventh Army, and though their officers had little advance knowledge of conditions on the island, the Aviation Engineers were able to keep up with the whirlwind campaign. As it ended, the long-sought separate organization came with the formation of the AAF Engineer Command, which was to serve as a model for the larger structure used later in the invasion of northern Europe.

1.2.13. The invasion of Italy called first for the familiar procedure of laying down emergency fighter strips, in Calabria and then for Anzio. Later came the less spectacular but more lasting task of building all-weather fields for strategic bombers in Apulia and around Foggia; in both areas the heavy rains of "sunny" Italy caused serious but not insurmountable difficulties. By comparison, the assignments in Corsica and southern France in connection with the DRAGOON operation were routine. 1.2.14. Operation Overlord's planners recognized that airfield availability would be a determining factor in its success or failure. A tactical air force, to be truly effective, required airfields as close to the front lines as possible to support a fluid and fast-moving operation. To provide these airfields, a new organization was established, the IX Engineer Command. Originally, no separate engineer command had been planned. However, because of the North African experience, where aviation engineers functioned as an integral part of the air force, Army Air Forces leaders such as Lieutenant General Lewis Brereton strongly pressed for an engineer command. A provisional command conducted the training for the aviation engineer battalions until March 30, 1944, when the IX Engineer Command was activated.

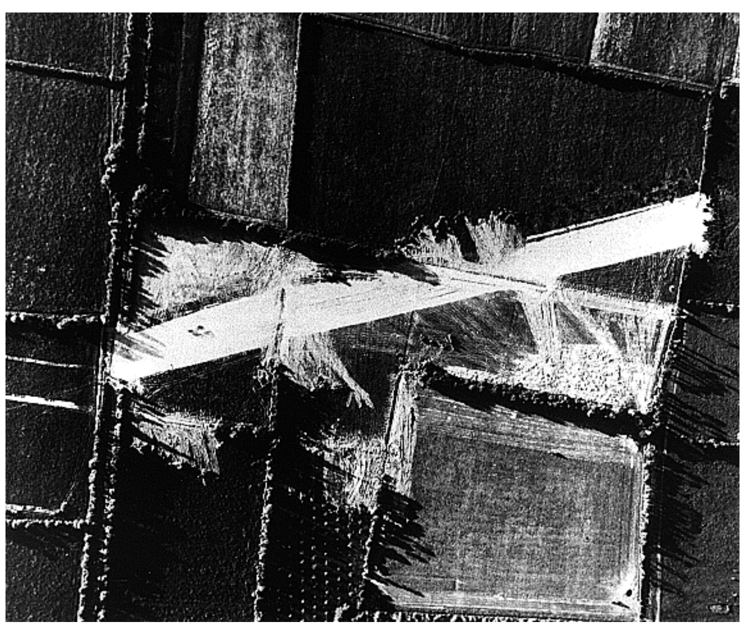
Four regimental headquarters commanded sixteen battalions of engineers, while the command headquarters retained control of three airborne battalions and a camouflage battalion. Brigadier General James B. Newman became the Commander, IX Engineer Command (figure 1.3).

Figure 1.3. Colonel Shilling and General Newman at Butler Building Construction Site.



1.2.15. At 1050, 6 June 1944, first squad, third platoon of Company A of the 819th Engineer Aviation Battalion landed at Utah Beach, under the command of First Lieutenant Herbert H. Moore. When the ramp was lowered, the engineers waded the final 200 yards to the beach in waist-deep water. A D-7 tractor followed closely behind and after that came the second squad, then a motor grader, the third squad, another grader, a 2 1/2 ton truck, and finally another D-7 tractor. Men and equipment dispersed on the beach with only one casualty from shrapnel. Lieutenant Moore had to wait until the infantry had taken the land for the emergency landing strip. Although the equipment had dispersed on what turned out to be mud flats, it was extricated and reached the site by 1800. Work commenced immediately and the engineers completed the strip by 2115 (figure 1.4). The men dug foxholes and spent their first night on the continent avoiding the considerable sniper fire.

Figure 1.4. Emergency Landing Strip at Normandy.



1.2.16. The landings at Omaha did not go as planned. Elements of the 834th, under the command of Lieutenant Colonel John Livingston, made repeated attempts to land at their scheduled location. Their landing craft grounded several times on beach obstacles in point blank fire. On D+1, the unit beached at the nearest feasible location, several miles east of the planned site. The remaining elements of the unit landed at various locations up and down the coast. The scattered troops met at their intransit area, but found the planned sites for airfields still under enemy control.

1.2.17. Also at Omaha Beach, the lead party of the 820th proceeded to about two miles from the shore where a Navy patrol ordered them to return and stay clear of the enemy shelling. At 1630, they succeeded in reaching the beach, but a shell struck close by just as the ramp was being lowered, injuring several men from other units who were also in the craft, and seriously damaging the craft itself. They turned back and tied up to a landing ship, tank (LST) for the night. The next morning, another landing craft towed them to shore.

1.2.18. The two initially planned sites remained in enemy hands by D+2, so the engineers of the 820th and 834th found another suitable location near St. Laurent-sur-Mer. They rapidly scraped out an emergency landing strip at the site, still awaiting for the other sites to be taken. The Army made an urgent request for an airstrip to evacuate wounded soldiers and receive emergency supplies, so the engineers continued to develop the St. Laurent-sur-Mer emergency landing strip into a transport strip. By 2100 on D+2, they had constructed a 3,500 by 140-foot runway, that received its first aircraft the following morning. For the next several weeks, an average of 100 C-47s landed at the airfield daily. Although unplanned, this became the first operational American airfield in France.

1.2.19. Engineers continued to construct airfields in the weeks following the invasion. Men of the 816th marched 14 miles inland to the site of their planned airfield at Cardonville. They arrived in time to help the Rangers clear the area of German soldiers, taking thirteen prisoners. They then went to work constructing an airfield, completing it on 13 June, that supported 500 fighter missions in the first week. By the end of June, 11 American airfields were in operation and five more under construction. The original plans called for approximately two-thirds of the airfields to be built to fighter specifications--a 3,600-foot runway. However, the Luftwaffe's ineffectual reaction to the invasion permitted the Ninth Air Force to use their aircraft as fighter/bombers, which dictated the construction of 5,000-foot runways.

1.2.20. Aviation Engineers used three types of expedient runway materials during World War II--Marston Mat (known as Pierced Steel Planking or PSP), Hessian Matting, and Square Mesh Track.

1.2.21. PSP was first tested at Langley Field, Virginia, in 1940. It was an example of design genius because of its simplicity, functionality, and endurance. Each section was 10 feet long, 15 inches wide, and weighed 66.2 pounds. Originally manufactured as a solid plank of ribbed steel, engineers decided that punching holes would reduce the weight by 17.5 percent, help drain water and allow drying of the soil underneath, permit backfill to be poured into soft spots or depressions, and contribute to camouflage and dust control by letting vegetation grow through the holes (figure 1.5).

Figure 1.5. Laying Pierced Steel Planking (PSP).

1.2.22. Assembly of the PSP into a runway was a simple process. Each mat had thirty slots and L-shaped hooks on both long edges. One or two men dropped the hooks of one piece into the slots of another and then shoved it forward 2 inches, locking the pieces together. Easily removed U-shaped steel clips provided further locking protection on the runway edge. The engineers laid the mat lengthwise, across the runway, usually beginning in the middle and working towards both ends. As the aviation engineer troops became proficient, they were able to lay mat from both ends and the middle simultaneously. Any discrepancy was solved by dragging sections into place with bulldozers. The subsurface was a variety of materials, depending on the projected permanence of the runway, locally available materials, and the existing soil conditions. Leaves, palm branches, or straw created an effective barrier reducing the dust problem (figure 1.6). Repair of PSP was easy because the planks were laid with the hooks on one row facing the opposite direction of the next row. Two men with pry bars could remove a single mat or repair it in place. If the base below the PSP runway needed major repairs, large sections of planking could be rolled up to allow equipment to make the repairs. The runway could then simply be unrolled. At the end of the war, two million tons of PSP had been manufactured, enough to build nearly a thousand 150- by 5,000-foot runways.

1.2.23. Prefabricated Hessian Surfacing, known as Hessian Matting, was a common runway material used on the continent of Europe following the D-Day Invasion. It was a Hessian cloth (a type of burlap) coated with bitumen that had no load bearing capacity, but served as a waterproof cover for the grade (figure 1.7).

Figure 1.6. Using Straw Under PSP to Control Dust.

Figure 1.7. Square Mesh Track Being Unrolled on Top of Hessian Matting.

1.2.24. Hessian Matting was laid in longitudinal strips, using a 50-percent overlap, thus giving a double thickness throughout. To facilitate accurate overlapping, the material had a red center line. The British developed a machine known as a "Stamplicker" to lay the matting. This device applied solvent (usually diesel fuel) to the bottom of the material as it unrolled off the truck onto the ground. The ends of the rolls were stapled together as they passed through the machine to make one long strip. Because these runways were slippery when wet, engineers sprayed the completed runway with diesel fuel and applied a coating of sand that was rolled into the surface by rollers. This provided an effective anti-skid surface.

1.2.25. Aviation engineers needed a temporary surfacing material for airfields to be used by light and medium weight aircraft. The runway material had to be lightweight, easily transportable, and quickly laid. In 1944, they began experimenting with concrete reinforcing mesh manufactured in England. Square Mesh Track had initial problems with excessive billowing and a failure of clips to hold the material together. The solution was to stretch the Square Mesh Track by pulling it with trucks and crimping individual wires.

1.2.26. Square Mesh Track's greatest advantage was its light weight. Square Mesh Track required only 250 tons of material for a 120- by 3,600-foot runway, compared to 1,150 tons for PSP. Engineers unrolled the Square Mesh Track either by hand or by pushing it in front of a jeep. As engineers tried different methods, they found that Square Mesh Track laid on top of Hessian Matting provided a satisfactory runway material. When rain and snow caused PSP to be adopted as the main surfacing material, Square Mesh Track was used in many of the "Sandwich" jobs that included Hessian Matting, Square Mesh Track, and PSP (figure 1.8).

Figure 1.8. "Sandwich" Runway Surface.

1.2.27. From D-Day until V-E Day the activities of IX Engineer command were intimately entwined with those of the tactical air forces and, indeed, with those of the ground troops. Along with other invading forces, the engineers were hampered by the rugged resistance of the Germans at the beaches and in Normandy; their schedules were disrupted by the slow breakout from the Cotentin and equally by the unexpectedly rapid advance thereafter. Important changes in plans were required by the need for more fighter-bomber fields than had been predicted and by the decision to base medium bombers on the Continent.

1.2.28. As the First and Third Armies moved across France supported by, respectively, the IX and XIX Tactical Air Commands, the Engineer Command was split into the lst and 2nd Engineer Aviation Brigades, each with the duty of providing the advancing armies a series of airfields in immediate support. Supply and transportation were never adequate, and aviation engineers were hard put to keep up with the breakneck pace of the ground troops. By V-E Day, 8 May 1945, nearly 250 airfields had been constructed or reconditioned for Allied use from Normandy to Austria and Czechoslovakia; 182 were still in use on V-E Day. During their peak period, the IX Engineer Command put an airfield into service every 36 hours (figure 1.9).

Figure 1.9. Assault Airfield Nearing Completion--Started From Each End.

1.3. Pacific Theater. Aviation Engineers saw action quite early during the War in the Pacific. The 803rd Battalion endured a 5-month journey to the Philippines in 1941, arriving just a few weeks before the Japanese attacked. The men repaired airfields, scraped out emergency runways and performed whatever engineering work was required. They soon found themselves serving as infantry troops, turning back a Japanese suicide attack at one point. The Japanese captured two of the companies on Bataan, but Company A managed to reach Corregidor. There they worked to keep Kindley Field in operation, in the hope that additional aircraft would be coming. They never did. The remnants of company A were among the last Americans to surrender at Corregidor.

1.3.1. In the Pacific and China-Burma-India (CBI) theaters, Aviation Engineers constructed airfields on coconut-forested atolls and in steamy jungles (figure 1.10), as the American forces closed in on the Japanese homeland. The engineers were often forced to abandon their construction equipment and pick up their weapons to defend their positions against the Japanese. In few instances were the Aviation Engineers in the Pacific areas or in the CBI able to call on the resources of an industrial society. Their supply problems were compounded by distance and low priorities. In the Southwest Pacific Area (SWPA), Aviation Engineers began their operations at Darwin in Australia early in 1942 and finished far to the north as the war ended. From the first, they worked side by side with Army and Navy engineers.

Figure 1.10. Airstrip Being Cut Out of a Tropical Jungle.

1.3.2. As SWPA forces held at Port Moresby and then began the slow movement northward, each jump in the hopscotch pattern of advance depended upon the previous development of new air bases. The terrain often was rugged, living conditions were extremely primitive, and the climate was debilitating and unhealthy. Sites for airfields had to be chosen on the basis of inadequate information, and land transportation was incredibly difficult. These factors made for the unorthodox methods, and in many cases the standards accepted for airstrips were far different from those demanded in the CONUS or in the European theater of operations. But, whatever the book may have said, the strips laboriously hewn out of jungles or laid on coral islands (figure 1.11) still under enemy fire usually stood up to the pragmatic test of hard use. Road building frequently became a necessary adjunct to airfield construction, and more often than they liked, aviation engineers were employed in miscellaneous tasks bearing little relation to the air war.

Figure 1.11. Airstrip Being Built on Pacific Island.

1.3.3. Occasionally, advance intelligence was so faulty as to require a radical revision of plans, as at Hollandia, where designs for a huge complex of bases to be built by 25,000 Aviation Engineers were scaled down to a minimum, with most of the force moving on to develop an airfield on another island instead. In regard both to construction supplies and provisions for their own existence, Aviation Engineers felt that they suffered unduly while the Seabees lived a life of plenty; they also felt some resentment when the highly publicized Seabees received wide acclaim for accomplishments no different from those of the unsung Aviation Engineers.

1.3.4. With the return to the Philippines, Aviation Engineers passed a crucial test under fire in the mud of Leyte, then moved northward to Mindoro and Luzon, where a variety of tasks necessary for the restoration of those islands competed with airfield construction for the attention of the engineers.

1.3.5. In the North Pacific the Japanese threat of June 1942 seemed to reinforce ideas about the strategic importance of Alaska and to demand the immediate extension of air facilities in the area. As a point of attack against Japanese-held Kiska and Attu, two companies of Aviation Engineers built a usable airfield on Adak, Amchitka, and Attu working under the most extreme climatic conditions imaginable.

1.3.6. In the China-Burma-India theater, the activities of the Aviation Engineers were as far from normal as were most operations in that vast theater of operations. In China there were no US aviation engineer units and only a handful of officers to advise General Chennault, and to some extent, the Chinese who built his airfields. In India the Tenth Air Force used fields prepared by native labor under British supervision. Until 1944, all five aviation engineer battalions in CBI were assigned to work on the Ledo Road, where they were joined later by three other battalions. Their fine work was finished only with the completion of the road early in 1945. Though some units then moved into China, they arrived too late to accomplish much before V-J Day. Perhaps the most nearly normal project in the theater was when Aviation Engineers, under AAF control, supported the campaign in Burma and developed the important complex of bases around Myitkyna.

1.3.7. The task of preparing bases for the B-29s of the XXI Bomber Command in the Marianas was one of the largest jobs Aviation Engineers faced during the Pacific campaign, but it went smoothly. Fifteen battalions were available for developing the islands. Plans based on insufficient data had to be modified frequently. Nevertheless, the B-29 fields with their then generous airfield criteria were built in time to accommodate the constantly expanding force of heavy bombers. An even greater construction project, involving the use of 93 aviation engineer battalions, was planned for Okinawa but was canceled when Japan surrendered. Had World War II continued a few months longer, many of the veteran aviation engineer units of the European theater would have been assigned to this mammoth construction program. Instead, most of the Aviation Engineers went home and after discharge participated in the greatest building boom in American history.

1.3.8. During most of World War II, maintenance and repair of Army Air Forces installations was carried out by general service engineers known as Post Engineers. At the end of the war, 1,435 airfields located in 67 foreign countries had been used, built, or improved for or by the Army Air Forces. In the Zone of Interior, 504 airfields were on an active status and 136 on a temporary inactive status.

1.3.9. When the Air Force became a separate service in 1947, Air Force construction continued to be programmed and budgeted by the Army Corps of Engineers. The Air Force Civil Engineer function operated as the Directorate of Installations under the Deputy Chief of Staff, Materiel. At the base level, the Air Installation Officer was responsible for the repair and maintenance of installation facilities, grounds, and utilities.

1.3.10. Fire protection has been a critical part of the Air Force Civil Engineering since January 1945, when War Department Circular No. 36 transferred all crash rescue and firefighting activities and equipment from the Army Service Forces to the Army Air Forces (AAF). At HQ AAF, fire protection was assigned to the Assistant Chief of Staff, Materiel and Services, Air Installations Division. At the base, structural firefighting was under the post engineer, while aircraft crash rescue (figure 1.12) reported to the aircraft maintenance officer. In 1949, these were placed under the Air Installation Officer. The two functions were integrated under a single Air Force specialty code in 1953.

1.4. Korean War. The Korean War presented tremendous challenges for Air Force engineers. Special Category Army Personnel with the Air Force (SCARWAF) troops were responsible for the construction, upgrading, expansion, and rehabilitation of airfields. The Air Force furnished funding and manpower authorizations; the Army organized, trained and equipped the SCARWAF engineer units and then placed them under Air Force control. This confusing concept led to most of the problems that hampered the engineers throughout the war.

Figure 1.12. Firefighters Practicing A New Crash Rescue Technique (1945).

1.4.1. A SCARWAF battalion initially had an authorized strength of 800 men. In July 1951, each battalion was augmented to a strength of 977. During the first year of the war, most units were woefully ill-equipped and under strength. The manning they did possess was often poorly trained and inexperienced.

1.4.2. Originally, the First Construction Command, Fifth Air Force, controlled SCARWAF forces in Korea. This unit was disbanded in December 1950 and the Fifth Air Force Director of Installations was given command of both SCARWAF troops and installation squadrons.

1.4.3. Company A of the 802d Engineer Aviation Battalion (EAB) was the first Aviation Engineer unit to land in Korea, coming from Okinawa. Beginning on 11 July 1950, engineers rehabilitated the airfield at Pohang, using World War II-vintage equipment. They put a 500-foot PSP extension on the east end of the runway and constructed a 40-foot wide taxiway with 27 hardstands for P-51 Mustangs. In early August, the engineers left their equipment and joined the infantry to defend the base against advancing North Korean troops.

1.4.4. The 822d EAB arrived from Okinawa on 30 July and began work on Taegu Airfield. It had one sod runway, 4,000 feet long. Working around the clock, engineers, aided by 500 Korean workers, laid 4,300 linear feet of a new PSP runway and went to work on the existing parallel runway. On 16 August, the unit was forced to evacuate to Pusan. Returning a month later, the engineers completed the runway to a length of 6,215 feet with a 1,000-foot stabilized overrun. This allowed F-80 jet aircraft and heavy C-119 transports to use the airfield. The 811th

EAB put Kimpo and Suwon airfields back into service just 10 days following the Inchon invasion.

1.4.5. During the early stages of the Korean War, the low level of readiness of the SCARWAF aviation engineer units seriously affected the conduct of air operations. This problem was compounded by the introduction of several new aircraft. Newer aircraft such as the F-80 and C-124 required longer and wider runways, larger taxiways and parking aprons, increased pavement thickness, and more stringent design criteria for gradients and clear zones. Larger fuel and munitions storage, and more support facilities were requirements that added to the burden. In sum, a much larger construction effort was needed to expand existing Korean airfields or build new ones. In World War II, airfield construction was expressed in terms of battalion days or weeks; in Korea, it was battalion months.

1.4.6. Other factors contributed to the reduced capabilities of SCARWAF Aviation Engineers during the early months of the conflict. Although the Far East Air Forces had 3,600 SCARWAF authorizations, only 2,322 were filled, and their equipment consisted of obsolete leftovers from World War II. As a result of these handicaps, the initial effort was concentrated on upgrading South Korean and WWII Japanese-built airfields. Built for the lighter and slower combat aircraft of World War II, these airfields soon deteriorated under the heavier weight of modern aircraft. The Aviation Engineers attempted to solve the problem by overlaying the thin concrete surfaces with PSP. However, little was done to ensure a proper subgrade. (The problem of poor subgrade reappeared in Southeast Asia.) The PSP overlay could have been effective had traffic been restricted to fighter aircraft; however, under the weight of transport aircraft, the base courses rapidly failed. But operations had to continue, and as reported at the time, the PSP "rolled and buckled, clips worked loose and lacerated aircraft tires, while the perforated surface slowed the planes and increased the takeoff roll" (figure 1.13).

Figure 1.13. Damaged PSP Being Repaired.

1.4.7. Because it was the only means of providing expedient airfield surfaces, the existing stock (5 million square feet) of PSP was soon depleted. By September 1950, with a supplemental shipment of another 5 million square feet, 8.3 million square feet of PSP matting had been laid in Korea and Japan. By December 1950, losses as a result of the Chinese Communist Forces offensive and other emergency requirements had once again depleted PSP supplies.

1.4.8. Aviation engineers had to be redeployed in the southeastern part of Korea when the Chinese Communist Forces offensive gained momentum. In its wake, the Aviation Engineers lost some of their equipment at Pyongyang and Chinnampo but it was quickly replaced. By December 1950, the Chinese Communist Forces advance had been halted and UN forces began to take the offensive again in January 1951. For the remainder of the conflict, the area along the 38th parallel became the main battlefield.

1.4.9. As the war entered into this stage, the lack of training, manpower, and worn-out equipment still plagued the aviation engineer units, severely degrading construction efforts. The acute shortage of repair parts and mechanics, and equipment abuse by untrained operators further aggravated an already difficult situation. The assessment of the engineers' role and accomplishments during the first 2 years of war was generally disappointing. The official Air Force history of the Korean War stated: "In 2 years of war in Korea no single factor had so seriously handicapped Fifth Air Force operational capabilities as the lack of adequate air facilities."

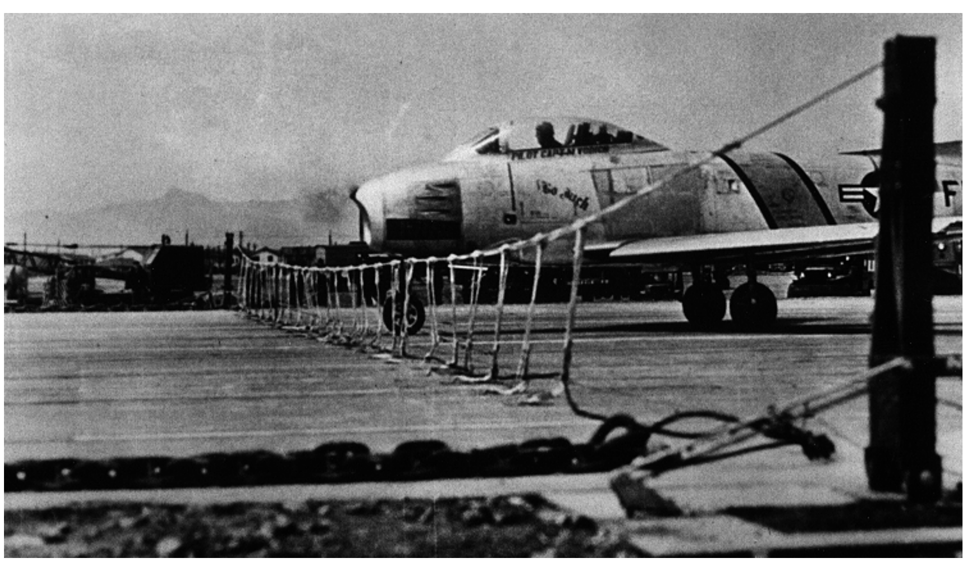
1.4.10. Recognizing the problem of SCARWAF training, all CONUS training was placed under the control of the Continental Air Command and the Aviation Engineer Force was established. Ten aviation engineer units with a total strength of 3,484 personnel were assigned to Aviation Engineer Force. The creation of the Aviation Engineer Force was an important first step to correct the training problems, but it was far short of solving them all. It took 2 years after the start of the war, until June 1952, for the Fifth Air Force to attain its required aviation engineer capability of 10 battalions.

1.4.11. Considering the many difficulties encountered by SCARWAF units during the conflict, their many accomplishments are doubly impressive. During the early stages, Aviation Engineers used expedient methods to get as many airfields operational as possible; it was the only viable option because time, people, equipment and materials were limited. As the frontlines stabilized in 1951, and more manpower became available, the effort shifted toward more durable construction methods. At Taegu, Kunsan, and Suwon 9,000-foot semipermanent runways were built to last at least 2 years. From this point on, the construction effort in Korea increased dramatically. By the end of the war, Aviation Engineers had built or repaired 55 separate airfields from which the Air Force flew nearly 700,000 sorties.

1.4.12. Installation squadrons operated and maintained the airfields. The squadron's 3 officers and 60 enlisted troops, supplemented by 300-400 Korean laborers, constructed prefabricated buildings, established utility systems, and provided fire protection. Working in concert with aviation engineer battalions, the installation squadrons transformed airfields into air bases. Engineers constructed housing, administrative facilities, operational and maintenance structures at South Korean bases to support prolonged operations. They also deployed forward to assist in the operation of temporary airfields near the front lines during the fluid portion of the war.

1.4.13. Even with longer and wider runways, jet aircraft continued to be lost during takeoff and landing operations. The Air Force decided to test the application of an aircraft arresting barrier system similar to the Davis barrier used on aircraft carriers. The system adopted by the Air Force, the MA-1A, consisted of retractable stanchions which held the barrier in position and heavy anchor chain to decelerate the aircraft when it engaged the barrier (figure 1.14). In the first 2 weeks of use at Taegu, three F-84s (costing $200,000 each) were saved by the arresting system which cost $17,000. During the first 6 months, 36 engagements Although PSP matting caused many problems, most of the difficulty can be traced to the lack of a proper subbase and the failure to realize that metal matting is only a surface. Until something better was developed, PSP was the only matting available and Aviation Engineers did the best they could under the circumstances.

Figure 1.14. MA-1A Aircraft Barrier.



1.4.14. Problems relating to heavy equipment centered around lack of standardization and, at least during the early stages of the conflict, operator training. Equipment obsolescence and insufficient replacement parts presented difficulties as well.

1.4.15. Training deficiencies in the SCARWAF units posed a major problem throughout the conflict. Once the Aviation Engineer Force had trained ten of the rotational units, proficiency improved considerably. In its after action report, the Aviation Engineer Force concluded "...the Air Force had a vital need for aviation forces which were not combat engineers nor construction engineers but specialists in the art of building airfields."

1.4.16. Following the war, the Air Force requested permission to organize its own engineering function and transfer the 30,000 SCARWAF engineers from the Army. In 1955, however, the Secretary of Defense decided to leave the engineers with the Army and abolish the SCARWAF, thus leaving the Air Force without its own combat engineers until the establishment of the RED HORSE program in 1965.

1.5. A Professional Force. The 1950's were a period of significant growth in the basing of the Air Force. The elevation of the Directorate of Installations to Assistant Chief of Staff level from 1954 to 1957 was indicative of the increased engineering activities related to the massive strategic forces buildup.

1.5.1. With the beginning of operational planning for the ICBM, the civil engineering activity was reorganized to provide for design and construction supervision of missile ground support facilities. The designer of the missile ground environment had to work in an integrated fashion with the designer of the missile itself. When the ICBM became a part of the aerospace force, it automatically introduced engineering considerations as a major element for the selection and employment of weapon systems and resulted in an increase in the scope and volume of Air Force engineering. The construction of dispersed missile sites at various bases presented significant difficulties in the areas of operations, maintenance, and fire protection.

1.5.2. The design and construction of the Dye, BMEWS, and DEW Line (figure 1.15) installations presented many challenges. Extending from Greenland to Alaska, these sites were constructed under conditions that had never before been encountered and required ingenuity and perseverance to complete.

Figure 1.15. DEW Line Site.

1.5.3. In 1954, Air Force engineers began construction of the new Air Force Academy near Colorado Springs, Colorado. The Air Force Academy Construction Agency was created to oversee the work. The new institution reflected the role that aerospace power would play in the future (figure 1.16).

1.5.4. Air Force Engineer leaders stressed professionalism and registration in the 1950's and 1960's. In 1959, the Air Force Director of Installations was renamed the Director of Civil Engineering. At the base level, Air Installation Officers became Installation Engineers (and later, Base Civil Engineers). This demonstrated the change in the perception of Air Force Engineers from "handymen" to professionals.

Figure 1.16. Air Force Academy.

1.6. Southeast Asia Conflict. In the 1960's, Air Force Engineers responded to several emergency situations and the growing American commitment in Southeast Asia and as a result, gave the Air Force the contingency capability necessary to respond worldwide. The Lebanon crisis of 1958, Berlin crisis of 1961, and Cuban Missile Crisis of 1962 demonstrated a need for mobile civil engineer teams ready for immediate deployment to perform construction work during wartime or other emergencies. A HQ USAF study group recommended that Prime BEEF (Base Engineer Emergency Force) teams be created to respond worldwide when needed.

1.6.1. As the Indochina War ended with the departure of French forces, Communist activities in Southeast Asia started to gain the attention of the United States. By late 1961, as the insurgency in the Republic of South Vietnam began to threaten the country's continued existence, a decision was made to increase the US military advisory contingent. The buildup of personnel and equipment drove a concurrent requirement for new construction. Some PACAF civil engineers were deployed on TDY to Vietnam to establish tent camps and basic support facilities as interim measures until more permanent facilities could be constructed by contract. Other civil engineers on TDY also provided operations and maintenance support at several locations in South Vietnam. The US Military Assistance Command, Vietnam (USMACV) had initial responsibility for contract construction which then shifted to the Navy. As the construction effort continued to grow, the in-country contractor capability was soon saturated, while pressure to get the work done increased constantly. After President Johnson's statement on 4 August 1964 that the US would honor its commitment to South Vietnam, the US buildup of forces in Southeast Asia started to shift into high gear. The number of Air Force personnel and aircraft deployed to Tan Son Nhut, Bien Hoa, and Da Nang soon saturated these air bases. As a later study would show, the Army (as required by DoD Directive) had no dedicated units to meet Air Force troop construction requirements in an overseas theater. The Air Force, prohibited by that same directive from having its own wartime capability, had to rely on civilian contractors to provide its facilities for combat mission support.

1.6.2. Many new bases became operational as the buildup continued, but the flow of CE forces did not keep pace, at least not until 1966. The BCEs relied on indigenous labor to provide beddown facilities for the incoming forces. Billets were not standardized and ranged from hardback tents to "Bien Hoa" huts, or whatever could be put together quickly with the skills available. But billeting was a relatively minor problem compared to the constantly increasing challenges that confronted the BCEs. Water shortages in the dry season followed by floods during the monsoons; sanitation hazards; heavy demands on power generation and utilities, maintenance of aircraft barrier systems; and daily flightline emergencies were some of the major concerns. Because of the climatic effect on equipment and temporary facilities, constant maintenance became a heavy burden. During the Vietnam War, firefighters formed Pedro units, comprising airborne firefighters who responded to crash scenes away from a base. Air Force fire protection in Southeast Asia was the busiest fire protection organization in the world, responding to nearly 100,000 emergency calls a year.

1.6.3. While CE forces had received no specific warfighting training prior to their Southeast Asia assignment, they nevertheless demonstrated the capability that was necessary to support the combat mission until better capabilities could be developed. The Prime BEEF program implemented in late 1964 was to fill the need; it was put to the test just a few months later.

1.6.4. Lack of parking space and a rapid buildup in numbers made it necessary to park aircraft close together on existing ramps. The absence of shelters, with only a few protective revetments available, made aircraft highly vulnerable to accidental explosions and enemy attack. In May 1965, at Bien Hoa, the inevitable happened when a bomb accidentally exploded on a B-57 parked among a cluster of aircraft (figure 1.17). The sympathetic detonations that followed killed or injured 105 people and destroyed or damaged 45 aircraft. Some form of protection from a similar accident or enemy action had to be found.

Figure 1.17. B-57s Damaged and Destroyed.

1.6.5. After prototype testing at Eglin AFB, Florida, the Air Force decided on a steel bin revetment filled with compacted soil to provide the needed protection. Unable to obtain engineer support from the heavily committed Army to meet Air Force requirements (including revetment construction), three CONUS-based, 28-person Prime BEEF teams were deployed to construct revetments at Bien Hoa, Tan Son Nhut, and Da Nang. This group of three teams was known as Prime BEEF I. By the time their 120-day TDY ended in December 1965, Prime BEEF I had many accomplishments to their credit, including more than 12,000 linear feet of revetment constructed at three bases (figure 1.18). Not only had they provided greater protection for combat aircraft, but more significantly, these teams had validated the Prime BEEF concept. Wartime necessity had given Air Force Civil Engineers a warfighting capability.

Figure 1.18. Revetment Under Construction and Protecting Aircraft.

1.6.6. Other groups of Prime BEEF teams followed to accomplish vital mission support projects. Prime BEEF II, an 18-person plumbing team laid over 2 miles of water lines at Tan Son Nhut; provided nine latrines and constructed sewer mains, septic tanks, and leaching fields. Prime BEEF III arrived in October 1965; composed of six teams with a total strength of 225 men, these teams were tasked to support the beddown of new Air Force units. Working with BCEs at various bases, each of these deployments was a success that attracted the attention of the leadership. By 1968, over 1,600 people from nearly 60 individual Prime BEEF teams had responded to support urgent facility requirements in Southeast Asia.

1.6.7. However, a more long term, heavy construction and repair capability was needed to support the rapid force buildup in Southeast Asia. On 10 May 1965, Secretary of Defense Robert McNamara asked Secretary of the Air Force Harold Brown if the Air Force had the capability to construct expeditionary airfields and, if not, what could be done to develop such a capability. In August 1965 the organization of Civil Engineering Squadrons (Heavy Repair) was proposed and two squadrons were requested for assignment to PACAF. The mortar attack on Bien Hoa during that same month, when 11 aircraft were damaged, intensified the concern and need for a greater organic capability. One month after the proposal was made, the Tactical Air Command was tasked to organize, train, equip, and prepare two squadrons for deployment to South Vietnam. Called Rapid Engineer Deployable Heavy Operational Repair Squadron, Engineering (RED HORSE), these squadrons were to be self-contained units with their own equipment and supplies, capable of deploying anywhere in the world. RED HORSE squadrons were to maintain their own identity when operating in the field.

1.6.8. The first two units were designated the 554th (Penny Short) and the 555th (Triple Nickle) Civil Engineering Squadrons, Heavy Repair (CES [HR]). By 15 December 1965, training of these units was underway at Cannon AFB, New Mexico; "graduation" took place on 26 January 1966. Even before training was completed, all of the 390 items of construction equipment to support the two squadrons were ready for shipment at the Gulfport, Mississippi port of embarkation; it was an extraordinary feat accomplished in just 85 days after Warner Robins Air Materiel Area had been tasked to provide this equipment. The two RED HORSE Squadrons arrived in South Vietnam in February 1966 with the 554th assigned to Phan Rang AB and the 555th going to Cam Ranh Bay.

1.6.9. The 554th at first concentrated on repair of the aluminum matting runway where severe rains and poor initial construction had caused the subbase to fail. Repair was accomplished by excavating to depths of up to 8 feet and replacing subgrade material, installing subdrains, and laying new base course material. The work proceeded without interruption of air operations. Later the 554th built aircraft shelters, shops and other support structures, constructed NAVAID facilities and taxiways, and installed aircraft arresting barriers.

1.6.10. The 555th RED HORSE Squadron performed similar tasks to maintain continued flying operations at Cam Ranh Bay; they were also active in new facility construction and improvement of roads and the utility systems.

1.6.11. By the end of 1966, a total of six RED HORSE units had been organized and deployed to SEA. The 556th arrived at U Tapao AB, Thailand, at the beginning of July 1966 and engaged primarily in building construction. Members of the squadron also completed work at five other bases in Thailand. The 819th's role in Vietnam was unique among RED HORSE squadrons in that it deployed to an undeveloped area, classified as unsecured, to establish a base camp without recourse to any base support functions. The mission of the squadron was to construct the buildings at Phu Cat while the construction combine of RMK/BRJ (Raymond International, Morrison-Knudsen, Brown and Root, and J.A. Jones) constructed the airfield. Phu Cat became the one base in South Vietnam at which almost all building construction and the greatest percentage of earthen and paving construction was accomplished by a RED HORSE squadron--the 819th. The 820th deployed to Tuy Hoa AB in October 1966. This unit completed nearly 50 percent of all construction completed at Tuy Hoa, including: 170 aircraft protective revetments, 120,000 square feet of wooden buildings, and 175,000 square yards of AM-2 matting. In addition, the 820th operated a rock crusher 9.5 miles from the base and hauled aggregate through enemy-held territory to the base. The 823d reported to Bien Hoa AB in October 1966. Operating out of Bien Hoa, the squadron reorganized into four self-sufficient units. By January 1967, deployed units were in place at Tan Son Nhut, Vung Tau, Da Nang, and Pleiku, while a unit remained at Bien Hoa.

1.6.12. As the many RED HORSE squadrons were beginning to prove their capabilities as a warfighting engineering force, they were organized into the 1st Civil Engineering Group directed by the 7th Air Force Civil Engineer. These squadrons carried out major construction on several bases and completed much of the vertical work left undone by the contractors. RED HORSE squadrons constructed over 400 concrete aircraft shelters at six bases in South Vietnam between 1967 and 1969. The RED HORSE squadrons succeeded in making the bases much more livable for Air Force personnel.

1.6.13. The first RED HORSE units deployed to Southeast Asia for 1-year tours. However, there was no program for training replacement personnel for the initial cadre. In 1966, Tactical Air Command established the Civil Engineering Field Activities Center at Eglin Auxiliary Field #2 and activated the 560th RED HORSE Squadron to operate the site. The 560th, comprised primarily of returning "Horsemen", conducted 60 days of academic and field training for RED HORSE replacement personnel. The hot, humid climate at Eglin Auxiliary Field #2 made it an ideal training site for Southeast Asia-bound personnel. Also, the isolated site allowed the training cadre to establish a "typical" Southeast Asia RED HORSE camp away from the main base. When RED HORSE requirements in Southeast Asia began to scale back, the training was no longer required. The Civil Engineering Field Activities Center closed in January 1970 after training over 5,000 personnel.

1.6.14. At the peak of activity, RED HORSE in-theater strength reached 2,400 military personnel and 6,000-plus host nation personnel. In 1969 the workload for RED HORSE decreased, and some units were deactivated or redeployed to other locations, leaving two squadrons in South Vietnam by the end of 1970.

1.6.15. In 1966, the Air Force was increasing its daily missions in support of the buildup of US ground forces in Southeast Asia. The Air Force had several squadrons of aircraft ready for deployment to South Vietnam. However, existing bases were loaded to the saturation point and building an additional base posed other problems. The construction capability of both the Army and Navy was already overburdened, as was the existing civilian construction combine, RMK/BRJ.

1.6.16. The Air Force responded with Project Turnkey, a concept for constructing a new base in minimum time. Project Turnkey was a single package whereby the new base would be brought to combat operational status in just 7 months, with the complete air base to be finished within 12 months. This was a new experience for the Air Force, because it had never had sole responsibility for the construction of an operational air base.

1.6.17. The site chosen for the new air base was on the coast, near the village of Tuy Hoa. The initial operational facility included a 9,000 foot runway of AM-2 matting, a taxiway, parking apron, pre-packaged tent facilities, and bladder systems for petroleum storage. This was followed by construction of sustained operational facilities to include a parallel 9,500-foot concrete runway, plus maintenance, cantonment, and operational facilities.

1.6.18. The first shipments of construction supplies came in over the beach and were off-loaded by Filipino stevedores using landing craft. All of the contractor camp facilities were erected in their planned permanent locations for later Air Force use.

1.6.19. A major part of the construction effort was first directed toward completion of the aluminum mat runway so that operational status could be achieved at the earliest possible date. By early October, the first sections of aluminum matting could be placed in position. Mat emplacement proceeded at a rate of 600-800 feet of runway per day. Simultaneously, construction was expedited on all basic facilities required for the interim operation of the base. The aluminum mat runway was finished by 12 November 1966, a full 6 weeks ahead of the projected completion date. On that same day the new Tuy Hoa runway received its first aircraft, an Air Force C-130 and a C-124. These transports brought in the ground control approach mobile unit and other navigational aids required for use of the runway. Three days later, F-100s of the 308th Tactical Fighter Squadron deployed to their new home at Tuy Hoa.

1.6.20. The engineers then turned their attention to the construction of a concrete runway, concrete taxiway and the base permanent facilities. As F-100s took off from the AM-2 runway on daily missions, paving operations on the parallel runway moved forward at an accelerated pace (figure 1.19). Working both day and night, the paving crews were able to complete the concrete runway by 6 April--a full month ahead of schedule.

Figure 1.19. Local Vietnamese Civilians Helping Build the Tuy Hoa Parallel Runway.

1.6.21. Simultaneously, the 820th RED HORSE Squadron also worked around the clock to complete all of the sustained operational facilities. By June 1967, the entire air base was finished. Air Force civil engineers had proven that when necessary they could assume responsibility for the construction of an operational air base and complete it successfully.

1.6.22. In the middle of the Vietnam effort, Prime BEEF teams and the 557th RED HORSE Squadron deployed to South Korea in response to the rapid force buildup following the seizure of the USS Pueblo on 23 January 1968. These units constructed aircraft shelters, modular facilities, revetments, and other mission essential facilities to support the additional flying units in the country.

1.6.23. During the period of rapid expansion, the civil engineering warfighting capability had transitioned from virtually no capability to a viable, battle-tested capability represented by its Prime BEEF teams and RED HORSE squadrons. We cannot fail to mention the dedicated legions of engineers who, during their year-long tours in Southeast Asia, operated and maintained the air bases. They may get little glory, but they were an essential force to help keep the aircraft flying.

1.6.24. As American involvement in Southeast Asia began to wind down, RED HORSE capabilities were maintained at a high level of readiness. For the first time, the Air Force had organic heavy repair units designed for contingency support with no contingency at hand. In an effort to provide an engineer heavy repair capability as responsive and quickly deployed as the tactical aircraft they support, a training program was developed which produced tangible results by completing civil engineering projects which developed skills similar to those which would be required during a contingency.

1.6.25. One such project was the construction of an aircraft bombing and gunnery range at Blair Lakes, Alaska. The project consisted of clearing 1,200 acres of forest, construction of personnel quarters, operations and maintenance buildings, and erection of observation towers 40 feet in height to provide a standard range for use by Arctic construction operations.

1.7. A Peacetime Force. In 1975, the Directorate of Engineering and Services was created at HQ USAF when responsibility for mortuary affairs, housing, housing furnishings, bachelor quarters and transient quarters transferred to the Directorate of Engineering. Other Services functions such as food service were transferred in 1979 when the Air Force Services Office moved from the Defense Personnel Support Center, Philadelphia, Pennsylvania to HQ Air Force Engineering and Services Center (AFESC), Tyndall AFB, Florida.

1.7.1. In 1978, Services personnel began work on the Prime RIBS (Readiness In Base Services) program to give the Services field a contingency capability for feeding, housing, and clothing deployed troops. By using a building block concept similar to Prime BEEF, the Prime RIBS teams provided the necessary flexibility to respond to a variety of situations. The Air Force now had the capability to properly support troops in the field.

1.7.2. Air Force civil engineers assisted local communities recovering from natural disasters. Prime BEEF and RED HORSE teams responded in Northeastern Pennsylvania and Rapid City, South Dakota, to help in the search, rescue, and recovery operations following severe flooding. A tornado devastated Xenia, Ohio, in 1974. Engineers and firefighters from Wright-Patterson AFB, Ohio, assisted in the cleanup and helped put out many fires caused by gas leaks. In 1979, the 823rd RED HORSE Squadron assisted in recovery operations at Keesler AFB, Mississippi, which had been heavily damaged by Hurricane Frederick. More recently, Air Force civil engineers helped South Carolina and Florida residents in recovery efforts following Hurricanes Hugo and Andrew.

1.7.3. Protection and restoration of the environment became a major concern for Air Force Engineers in the 1970's. Responsibility for the Air Force environmental protection program was given to the Directorate of Engineering and Services. Terms such as Environmental Impact Statement, Installation Restoration, and pollution abatement became a part of the everyday language for Air Force civil engineers.

1.7.4. Great improvements in the quality of life for Air Force personnel were made in the 1970's. High priority was given to upgrading housing, recreational facilities, child development centers, and the workplace.

1.8. Readiness Rebirth. Programs set in motion during the 1960's and 1970's, such as Prime BEEF, RED HORSE, quality of life improvements, and environmental concerns continued to expand during the 1980's. The 1980's was also a period of challenges for Air Force engineers as they found themselves working on major projects overseas.

1.8.1. For example, Air Force engineers were responsible for the overall program management for the construction of two Israeli air bases in the Negev Desert. These projects presented special challenges because of the foreign government construction standards and the demanding construction schedule.

1.8.2. Off-station Prime BEEF team training had its beginnings at Wright-Patterson AFB, Ohio. That training, which developed limited beddown skills, moved to Tyndall AFB, Florida in 1972 with its parent unit--the CE Construction Operations Group, the forerunner to today's Air Force Civil Engineer Support Agency.

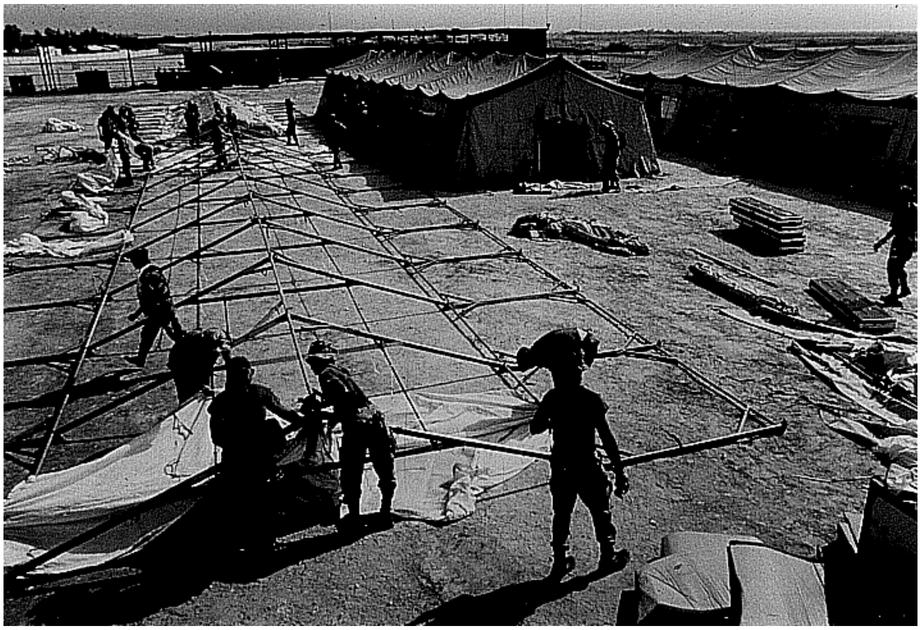
1.8.3. In 1979, HQ AFESC (now HQ AFCESA) relocated the Prime BEEF training to Field #4 at Eglin AFB, Florida. The runways at Field #4 enabled civil engineers to learn rapid runway repairs (RRR) as never before--on blown craters, and RRR became the focus. Prime BEEF team members also received some hands-on training in bomb damage repair, force beddown, Harvest Eagle equipment, chemical warfare defense, and explosive ordnance reconnaissance. In October 1985, a major change occurred. The Prime BEEF contingency training conducted at Field 4 was greatly expanded to include other specialties. The new Base Recovery After Attack (BRAAT) training combined the traditional Prime BEEF curricula with those of the disaster preparedness, explosive ordnance disposal, firefighting, services, and commissary specialties. They learned how their individual functional areas interface for a coordinated base recovery effort. For 7 days, students trained and exercised together in a realistic wartime environment.

1.8.4. Air Force Engineers were given the opportunity to display their capabilities during SALTY DEMO, an integrated Air Base Survivability demonstration conducted in May 1985 at Spangdahlem AB, Germany. For 5e days, the Engineers were involved in almost every aspect of BRAAT. The demonstration opened a lot of eyes and focused attention on the importance of the air base and the engineers' role in airbase recovery and sortie generation.

1.9. Gulf War. Air Force Engineers played a vital role during the Gulf War. Beginning on 7 August 1990, thousands of men and women began deploying to Southwest Asia in support of Operation Desert Shield/Desert Storm--the largest movement of combat forces since World War II. US Air Force personnel initially deployed to two primary locations, Dhahran and Riyadh. This soon grew to more than twenty locations in the region, ranging from international airports, to airfields under construction, to modern military air bases with state of the art facilities. Prime BEEF teams used Harvest Falcon assets to beddown deploying forces. Created in the 1980s, Harvest Falcon is a complete bare base set that provides both housekeeping and aircraft maintenance facilities. It combines aspects of Harvest Eagle and Harvest Bare and uses soft-wall, and some hard-wall, shelters for base support and hard-wall shelters for aircraft support. All Harvest Falcon equipment is designed specifically for Southwest Asia operations.

1.9.1. When billeting was unavailable at the sites, as was often the case, everyone went to work setting up "Tent City" (figure 1.20)--not just the engineers. Although some Air Force personnel initially were housed in hotels downtown, the terrorism threat forced them on base. Soon rows and rows of tents blossomed on the Saudi sand. Engineers erected approximately 5,000 tents during Operation Desert Shield. Many of the bases gave their tent city names such as "Camel-lot" and "Bedrock City."

Figure 1.20. Cooperating to Erect a TEMPER Tent.



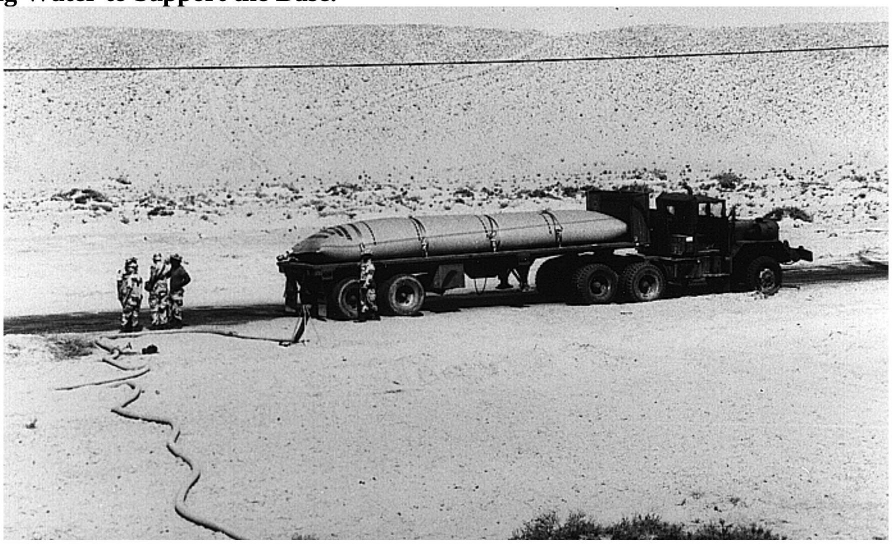
1.9.2. Electrical power was a critical element at all beddown locations, not only for aircraft support equipment, but for computer operations and air conditioning as well. For bare base operations, the Air Force used primarily 60-kW, 100-kW, and 750-kW generators. Early in the deployment, the smaller 60-kW and 100-kW portable generators provided primary electrical power to small clusters of tents or facilities. Such improvisions required frequent servicing of the equipment and refueling of generators and often lead to generator overload resulting in equipment failure. When they were later replaced or supplemented by 750-kW diesel generators, most Air Force power production personnel were unfamiliar with the larger units. The problem was compounded by the unavailability of Technical Orders for the equipment.

1.9.3. Generators began failing because of around-the-clock operations and a severe shortage of filters and spare parts that reduced the amount of scheduled maintenance that could be accomplished. The Air Force sent an eight-person Civil Engineering Maintenance, Inspection, Repair, and Training (CEMIRT) team to establish a depot repair capability for power production equipment at Thumrait, Oman.

1.9.4. In August, a shortage of primary distribution centers complicated the establishment of efficient power distribution systems, which resulted in a lack of safe hookups to the primary electrical distribution source. By 26 September 1990, however, the CEMIRT team at Kelly Air Force Base, Texas, designed an acceptable replacement using commercial off-the-shelf components and shipped the thirty-four primary distribution centers to the Gulf region sites and one to Sheppard Technical Training Center.

1.9.5. Water availability, its storage, and distribution were critical elements at beddown locations. USCENTAF Engineering and Services established a minimum secure water storage requirement of 100 gallons per person for 5 days. Drinking water initially was supplied as bottled water from local sources, and at some sites, it came from existing water distribution systems connected directly to commercial water sources. Nearly every site had to augment the in-place system. Other locations, such as Cairo West, had to haul water by truck (figure 1.21) and store it in bladders. The quality of water varied from site to site. A few sites only needed to add a small amount of chemicals to bring it up to standards. Others were required to process it through Reverse Osmosis Water Purification Units. Seventeen sites possessed water purification units.

Figure 1.21. Hauling Water to Support the Base.



1.9.6. Wastewater was collected either to underground storage tanks and pumped out by contractors or to a gray water pond for evaporation or absorption. However, soil conditions at some sites were a clay/sandy soil with a hard sandstone subbase that did not permit absorption, and high humidity slowed evaporation. Engineers constructed lagoon systems to pipe the gray water further from the cantonment area and reduce the potential health hazard.
1.9.7. Air Force Civil Engineers had to overcome many obstacles. Most engineers had never trained on the setup of Harvest Falcon equipment, and when TEMPER tents and utility systems began to arrive, many without technical orders, the engineers were uncertain exactly what constituted a complete set, how they were to be assembled, or how to repair the equipment. Furthermore, the delivery of Harvest Falcon equipment was delayed, parts were missing, shipping containers inappropriately marked, and in some cases, equipment was appropriated by organizations other than the consigned. War Readiness Spares Kits (WRSK) for several Harvest Falcon items often did not accompany the delivery or were incomplete because of funding. Inevitably, the most critical items were missing from the kits. Filters for generators were scarce, and engineers resorted to using tee-shirts or panty hose. Spares shortages forced operators to "abuse" their equipment. Many generators, for example, operated for sixteen maintenance cycles without any routine maintenance.
1.9.8. Engineers' accomplishments the first days and weeks of the deployment were noteworthy. The following is a summary of a Prime BEEF team's first month's work at King Fahd International Airport, Saudi Arabia:
The group accomplishments include laying over 4,000 tons of asphalt for roads, parking, ATH (Air Transportable Hospital), Helo pads and chow halls. We erected over 370 tents, set up 6 shower units, 10 latrines, a camp potable water and electric distribution system, a camp revetment system, designed and installed a bunker system, provided wood floors for admin/shop tents, constructed a mall complex consisting of a chapel, BX, movie tents, recreation center, laundry, and personnel facility. We have sectionalized the base for bomb damage repair purposes and set in place the teams to conduct those operations. We set up our own logistics operation to acquire material and tools we could not obtain elsewhere for which we continue to rely on for 100 percent of our support.
1.9.9. Firefighters established a fire protection capability by assembling vehicles, equipment, and firefighting agent (halon, dry chemical, and aqueous film-forming foam). They assessed the fire protection requirements of the site, evaluated the host nation capabilities, and assisted engineers in planning site layouts.
1.9.10. Their vehicles arrived from prepositioned storage sites in theater, some from European War Reserves Materiel storage and one from Korea. Many of them were not operational; arriving with broken pumps, dry-rotted fan belts and hoses, and few tools, hoses, or firefighting agent. Firefighting agent was not prepositioned and did not come with the vehicles. Empty prepositioned flightline fire extinguishers had to be refilled on the local economy at a much higher cost. Firefighters also encountered problems with the connection required to service halon tanks on vehicles, since the threads of US-made vehicles did not match British-made equipment and required fabrication of connectors. Throughout the deployment, nearly all sites relied to some extent on host nation firefighting assistance whose capabilities varied from site-to-site. In the early weeks, Air Force firefighters often shared facilities and equipment with host nation firefighters.

1.9.11. Engineers from the 823d and 820th RED HORSE Civil Engineering Squadrons began deploying in late September 1990. Soon the Air Force had a strong engineering capability available in theater. They broke up into smaller teams and spread throughout the region performing major construction work at numerous sites.

1.9.12. In November, when President George Bush ordered additional forces to the Persian Gulf region to provide an offensive capability, Air Force operations expanded at several bases with additional planes and people. As many sites stretched to maximum capacity, Lieutenant General Charles A. Horner, USCENTAF Commander, requested additional aircraft basing at existing sites and also dispersed airpower assets by opening additional bases. For engineers this meant another push to beddown deploying forces. This time, however, support forces prepared the support structure for the arriving forces. Nearly every existing base added blocks of tents, erected bath houses, and assembled aircraft hangars, general purpose shelters, and weapons storage areas.

1.9.13. RED HORSE engineers tackled larger and heavier jobs such as parking ramps and taxiways. At Shaikh Isa Air Base, Bahrain, the project called for constructing two concrete hardstands, 550 by 204 feet and 450 by 240 feet, with aircraft grounds, laying 100-foot wide asphalt taxitracks around each hardstand, tying taxitracks into the main taxiway, and constructing a 100 by 3,200-foot asphalt taxiway running parallel to the northern side of the south loop. They erected 36 revetments for the incoming aircraft. At Al Minhad Air Base, they constructed a 390-foot by 1,050-foot concrete and asphalt parking apron for an additional F-16 squadron. At Jeddah, the Prime BEEF engineers moved more than 150,000-cubic-yards of earth and created more than 400,000-square-feet of weapons storage area. The availability of a large-scale construction industry in the region enabled Air Force engineers to complete this type of work on time by contracting it out or by leasing equipment.

1.9.14. To put more aircraft closer to the Kuwaiti border, General Horner directed his engineers to open two new sites in Saudi Arabia. The first, about 60 miles south of Riyadh near the town of Al Kharj, had been programmed as a massive Saudi military installation, but only a runway, taxiway, and parking apron had been constructed. This project presented one of the biggest challenges facing Air Force engineers during the war. On 12 November, RED HORSE accepted overall responsibility for construction, and the 4th Civil Engineer Squadron (CES) and other engineering personnel would augment them. The 4th CES would operate and maintain the base after completion. On 25 November, RED HORSE, Prime BEEF, and contractor personnel went to work. The engineers compacted more than 200,000 cubic yards of red clay to serve as the foundation for a tent city. Eventually, 630 TEMPER tents, 4 kitchens, a gymnasium, 21 latrines, and 26 shower and shave units were erected (figure 1.22). They constructed a sanitary system, and a power plant of seventeen 750-kW generators, assembled an air-transportable hospital, and built six K-span structures. Al Kharj was ready for aircraft in early January, and by the beginning of the war, the base was home to 4,900 Air Force personnel.

1.9.15. At the same time, another RED HORSE team was busy building a forward operating location only 50 miles from the Iraqi border at King Khalid Military City, Saudi Arabia. This was initially planned as a small, 800-person site with a quick turn-around capability for aircraft flying missions to Iraq and Kuwait and to recover damaged aircraft. This required the installation of aircraft arresting barriers and an expanded fire response capability. The base continued to expand until it reached a population of 1,650 in mid-January and nearly 2,000 in February 1991.

Figure 1.22. Tent City at Al Kharj.

1.9.16. One of the outstanding engineering accomplishments of the war was the construction of over 5 miles of revetment at King Fahd. The effort paid dividends when a missile on a parked A-10 accidentally fired into a revetment wall. The earth-filled revetment stopped the missile and prevented damage to aircraft parked nearby.

1.9.17. Air Force Civil Engineers also deployed to Turkey, Spain, the Indian Ocean, England, Germany, France, Italy, Greece, Portugal, and within the United States. Torrejon Air Base, Spain, and Rhein Main Air Base, Germany, served as major transit bases for deploying to and from Southwest Asia. Rhein Main engineers redesigned the hydrant system enabling them to double the refueling capacity by using more trucks over a shorter distance.

1.9.18. Preparations for deployment assumed a feverish pitch throughout many areas of the world. Engineering teams reopened RAF Fairford, United Kingdom, and Moron Air Base, Spain, to support flying operations. At Moron, they patched the runway between missions to keep it open during Operation Desert Storm. Tankers were bedded down in France, Greece, and Italy. While host nations supplied the civil engineering support, Air Force firefighters deployed to provide crash and rescue operations for the aircraft. In the United Kingdom, engineers opened World War II-era contingency hospitals at Nocton Hall, Bicester, and Little Rissington, where water storage capabilities had to be supplemented with bladders.

1.9.19. In December 1990, the Civil Engineer forces in Europe began deploying to bases in Turkey--Operation Proven Force. At Incirlik AB, Turkey, a seventeen-member Prime BEEF team from Ramstein AB, Germany, quietly worked inside a warehouse, ordering supplies and pre-assembling tent floors. When the Turkish government granted approval on 16 January, engineers, aircraft crews, and other support personnel deployed to Incirlik. The engineers constructed "Tornado Town" and helped bed down deployed personnel.

1.9.20. When Operation Desert Storm began, civil engineers at the sites were ready--equipment and materials were dispersed, personnel and structural protection was complete. Firefighters assumed 12-hour shifts to support coalition Air Forces with fire protection for integrated combat turns with hot pit refueling operations. As combat sorties increased, so did the in-flight and ground emergencies, barrier engagements, and malfunctioning ordnance responses. Firefighters also extinguished fires on armed aircraft with a variety of problems caused by battle damage. At King Khalid Military City, the firefighters responded to 157 in-flight emergencies and 785 integrated combat-turn standbys during Operation Desert Storm.

1.9.21. For the United States Army Patriot batteries at Riyadh Air Base, King Khalid International Airport, and near Eskan Village, RED HORSE personnel constructed security berms. They rigged front-end loaders to assist in reloading batteries, reducing the reload time from 45 to 5 minutes. The Air Force also provided electricity to Patriot Batteries at Riyadh and Shaikh Isa Air Bases. On 17 January, the 820th deployed to King Khalid Military City to complete the integrated combat-turn project abandoned by the contractor.

1.9.22. In the days before the formal cease fire, a joint RED HORSE-Explosive Ordnance Disposal team tackled the most challenging post-war project on 26 February, when General Horner tasked them to deny two air bases in southeastern Iraq to any future use by returning Iraqi forces. On 6 March, two teams of engineers arrived at Tallil and Jaliba Air Bases in Iraq. At Tallil, RED HORSE used approximately 80,000 pounds of explosives, consisting primarily of 40-pound shape charges and MK-82, 500-pound bombs, to make cuts in the runway and taxiway every 2,000 feet. At Jaliba Air Base, the engineers denied a concrete runway and two parallel asphalt taxiways, with 27 cuts (72 craters up to 40 feet wide and 12 feet deep) in the pavement. Only 4 days later, on 10 March 1991, the final members of the team were aboard CH-47 helicopters returning to Saudi Arabia. When they were finished, the engineers concluded that it would cost less to build a new base than to clean up and repair the denied bases.

1.9.23. During the Gulf War, more than 3,000 Air Force engineers bedded down 55,000 people and 1,200 aircraft at nearly 30 sites. They erected 5,000 tents and constructed 300,000 square feet of buildings. They demonstrated they can provide a good living and working environment to support the projection of air power around the world.

1.9.24. Unlike previous wars or conflicts, civil engineers did not increase in numbers to support the war. Consequently, many CONUS Base Civil Engineers had to provide essentially the same pre-war level of support to their home bases, but with no increase in manpower.

1.9.25. Engineers also assisted in humanitarian efforts. Following the war, engineers deployed to Turkey and Iraq to help feed and shelter Kurdish refugees during Operation Provide Comfort. In 1992, both Prime BEEF and RED HORSE personnel traveled to Somalia to "Restore Hope" for the people there.

1.10. The 1990's. The 1990's launched a period of considerable change--and opportunity--for Air Force Civil Engineers. In February 1991, the Directorate of Engineering and Services was realigned directly under the Chief of Staff and redesignated as The Civil Engineer, an Assistant Chief of Staff. This ended a 13-year tenure under the Deputy Chief of Staff, Logistics and Engineering and returned Engineering and Services to the organizational level of the 1950s when it was known as the Assistant Chief of Staff, Installations.

1.10.1. Later in 1991, the 16-year marriage between Engineering and Services was ended when Services merged with Morale, Welfare, and Recreation. As Services was leaving, the Explosive Ordnance Disposal and Disaster Preparedness functions joined Civil Engineering, bringing essential capabilities to the Civil Engineer team.

1.10.2. Civil Engineer team training evolved once again in August 1993. The BRAAT training function, people and equipment were moved from Eglin to Tyndall AFB and placed under Air Combat Command. At the new location, designated the Silver Flag Exercise Site, program emphasis was adjusted to give increased attention to beddown skills. This change was driven by the most probable use of Air Force Civil Engineers in the era following the collapse of the Warsaw Pact threat.

1.11. Explosive Ordnance Disposal. Prior to the United Kingdom's effort to cope with unexploded bombs during the 1939-1940 blitz on London, there is no record of organized ordnance disposal. In response to the many bombing raids to which they were subjected, the Royal Air Force formed their first bomb disposal units. Through many successful experiences, and failures, these personnel became bomb disposal experts.

1.11.1. The United States EOD program dates back to April of 1941. The United States was not yet at war, but we were actively preparing for that eventuality. Embassy personnel and military observers were reporting on the actions of warring nations and as these reports were evaluated by the War Department Intelligence Section, recommendations were made concerning actions that should be taken by the United States. One area stood out. Delayed-explosion-bombs were creating havoc in Europe, taking a heavy toll in lives and industry. It was expected that if the United States entered the war, we would experience bombing of our cities and industries. As a result, the need for a bomb disposal program in this country received immediate attention.

1.11.2. In April 1941, the School of Civilian Defense was organized at the Chemical Warfare School, Edgewood Arsenal, Maryland, and part of the training was to be bomb disposal. It was later decided that both military and civilian bomb disposal personnel would be trained by the Army, and the responsibility for bomb disposal was placed under the U.S. Army Ordnance Department. The location of the Bomb Disposal School was changed from Edgewood Arsenal to the Ordnance Training Center, Aberdeen Proving Ground, Maryland.

1.11.3. In the interim the Navy, under a directive from the Chief of Naval Operations, instituted a Mine Disposal School in May of 1941. The school was located in Washington, D.C. and in December of 1941 was renamed the Navy Bomb Disposal School. In 1947, the Navy was assigned Joint Service responsibilities for basic bomb disposal training, making the bomb disposal career field one of the earliest joint service career fields established within the Department of Defense (DoD). 1.11.4. In 1942 the Royal Air Force started training United States Army Eighth Air Force personnel in bomb disposal procedures. At the same time, ordnance personnel were also being trained in bomb disposal techniques in the United States at the Army Bomb Disposal School, Aberdeen Proving Grounds, Maryland. These personnel supported combat operations in the Middle East, Sicily, and Italy from April 1943 through March 1944. Their duties included clearing unexploded bombs from Air Corps installations, clearing enemy ammo dumps, and safing or disposing of booby traps.

1.11.5. In the Pacific Island-hopping campaigns, bomb clearance challenges were numerous and enormous. Many times bomb disposal was being accomplished simultaneously with airfield recovery and construction. Bomb disposal personnel moved forward with advancing units using their talents to reduce the risk from both American and Japanese ordnance. The end of World War II signaled a slowdown for Army Air Force bomb disposal efforts. With the reduction of our military forces during the 1946 to 1950 time frame, the bomb disposal organization was cut way back and its people scattered throughout the military.

1.11.6. At the beginning of the Korean conflict, the function was revitalized, and the name Explosive Ordnance Disposal or EOD was adopted instead of "bomb disposal" to ensure that all new munition developments were covered.

1.11.7. On 21 May 1951, the Air Force picked up EOD responsibilities and assigned explosive ordnance disposal operational duties within the Zone of Interior to Headquarters Air Material Command (HQ AMC). Accordingly, AMC activated its first explosive ordnance disposal squadron, on 16 June 1952, when the 1st Ordnance Squadron, Aviation, was redesignated as the 1st Explosive Ordnance Disposal Squadron. The squadron was located at Wright-Patterson AFB, Ohio, with an authorized strength of 11 officers and 65 enlisted.

1.11.8. Combat operations in Vietnam were unique in nature because EOD personnel not only had to eliminate explosive hazards from conventional weapons systems, they also had to contend with the ingenious ability of the Viet Cong to acquire dud US bombs and projectiles and emplace them as mines or booby traps.

1.11.9. EOD's mission and responsibilities have continued to change and grow from its beginnings in World War II to Operation Desert Storm and the present. EOD involvement in joint and allied operations such as Joint Casualty Resolution Center missions in recovering missing in action (MIA) airmen in Vietnam and Laos; insertion behind enemy lines to destroy classified components of downed United States aircraft; base denial of enemy installations; support of intelligence gathering agencies; protection of the President of the United States and foreign dignitaries; and cleanup of ordnance storage depot catastrophes in foreign countries highlight the diversity of EOD activities used by all levels of the United States government.

1.11.10. The Air Force EOD mission is to protect people, resources, and the environment from the effects of hazardous ordnance. Air Force EOD must sustain the capability to disarm unexploded ordnance delivered or placed by enemy forces, and render safe United States ordnance made dangerous by accident or other circumstances. In addition, they are obligated to use their special expertise to assist federal and civil authorities when called upon in times such as dealing with terrorist or other criminal acts, accidents, and found explosive items.

1.11.11. EOD in the United States is a joint service program. Each branch of the service has specific responsibilities assigned to it by DoD. Some of these responsibilities are unique to one service and some overlap between two or more services. In 1971, the Navy was designated as the single manager for all common EOD training and technology. Today, training continues to be provided by the interservice staff at the Explosive Ordnance Schools located at Eglin Air Force Base, Florida and the Naval Surface Warfare Center Division, Indian Head, Maryland.

1.11.12. The Air Force EOD program has been managed by several disciplines, including Logistics and Operations, throughout its history, but has now found a home within the Civil Engineer community. There is precedent for this arrangement as well, as it is common with other US and foreign military services.

1.11.13. EOD personnel have built their tradition, through achievements gained in minimizing potential explosive accidents throughout the years. They are truly a valuable addition to the United States Air Force Civil Engineer community.

1.12. Disaster Preparedness. The Air Force Disaster Preparedness Program was established in 1965 as an outgrowth of the Disaster Control program of the 1950's, which had nuclear attack as its primary focus. The nuclear weapons accidents at Palmares, Spain and Thule Air Base, Greenland and Hurricane Camille which devastated the Mississippi coast, gave rise to a consolidation of several emergency, peacetime, and wartime related activities into one comprehensive program. An officer career field was established and augmented with existing enlisted resources to create the Air Force Disaster Preparedness Program.

1.12.1. As the US involvement in Southeast Asia grew in the late 1960's, Air Force Disaster Preparedness added to its list of responsibilities the need for planning, training for, and conducting conventional attack protective measures. As the Vietnam conflict came to a close, Disaster Preparedness moved its focus to the growing Soviet and Warsaw Pack threat against NATO. Limited capabilities for protection against the growing threat of chemical/biological attacks led to an accelerated program in the mid-1970's to equip and train USAF personnel against the chemical/biological threat. The Disaster Preparedness career field grew in numbers to meet these added responsibilities.

1.12.2. As attention was focused on Air Base Survivability and Operability in the mid-1980's, Disaster Preparedness programs again expanded to address the many deficiencies identified during the SALTY DEMO Air Base Operability capability demonstration held at Spangdahlem Air Base, Germany. Once again, as attention shifted to potential adversaries in Southwest Asia, Air Force Disaster Preparedness programs emphasized the importance of training, protective clothing, and equipment for the eventuality of chemical/biological and conventional attacks. In Operation Desert Storm, Disaster Preparedness personnel mobilized and deployed to numerous bases and sites throughout Southwest Asia to ensure that all Air Force personnel were ready to survive and operate.

1.12.3. Throughout these shifts in threat and as new responsibilities were added, Disaster Preparedness personnel continued to maintain a readiness posture and responded to numerous natural disasters, nuclear/conventional weapons accidents, incidents, hazardous materials incidents, and aircraft accidents. The Air Force Disaster Preparedness program in the past has ensured that commanders have the capability to prepare for and respond to all peacetime and wartime threats and hazards. As the Air Force prepares for the challenges of the future, Disaster Preparedness programs will continue to provide professional emergency management and air base operability support to plan, train, equip, and respond to all peacetime and wartime threats.

1.13. Today’s Challenge. This brief history of Air Force Civil Engineers introduces a series of pamphlets to help today's Engineers prepare for future peacetime emergencies and wartime support when once again they are called upon to demonstrate their "Can Do--Will Do" spirit. To the extent possible, the volumes in this series update the lessons of the past and provide current guidance. Some of those lessons are timeless. Methods and procedures relating to newer systems, for which there are no historic precedents, await the innovative ideas you develop and then pass along to those who will follow. The gains of the past must not slip away, nor should anyone be satisfied with the status quo. The development of new initiatives to further strengthen the capabilities of all engineers poses a continuing and exciting challenge to every member of the force.

1.14. Additional Information. If you are interested in additional information on Air Force Civil Engineer history, contact The Civil Engineer Historian at HQ AFCESA/HO, 139 Barnes Drive, Suite 1, Tyndall AFB, FL 32403-5319. Additional sources for historical information are cited in attachment 2.

Chapter 2

DISASTERS AND WARS HAPPEN

"However absorbed a commander may be in the elaboration of his own thoughts, it is sometimes necessary to take the enemy into account."

Sir Winston S. Churchill

2.1. Introduction. Contingencies and crises arrive with many names - natural disasters, accidents, terrorist actions, war, and military operations other than war. Only rarely can humans prevent them or control their intensity. Sometimes we can minimize their effects. But we can--and always should--be ready to respond. The chaotic environment following a disaster or an attack is not the time or place to begin thinking about how to respond. Effective post-disaster or post-attack response begins with planning and base preparations well before a crisis threatens. No publication can cover all possible circumstances that might be encountered in contingency responses around the world. Each civil engineer (CE) unit, working with other base organizations, must envision the likely emergencies that might occur considering its location and then develop appropriate courses of action for each. This guide is a tool to help civil engineers focus their planning efforts.

2.2. **Overview.** This chapter sets the stage for what a civil engineer unit must do to prepare for crises. It begins with a brief discussion of the types of disasters--natural, man-made, and hostile actions--that civil engineers are likely to encounter and highlights typical conditions which accompany such contingencies. Next it outlines the Air Force response to disasters on base and in nearby civilian communities, and highlights the civil engineers' role in contingency response. Finally, this chapter emphasizes the need for predisaster and preattack planning.

2.3. **Natural Disaster**. A natural disaster, as used in this publication, is any emergency which occurs as a result of some act of nature. Natural disasters include such phenomena as hurricanes, tornadoes, blizzards, floods, earthquakes, volcanic eruptions, tidal waves (tsunamis), and severe drought. The following paragraphs describe the causes and effects of some of these natural disasters and give civil engineer people an idea of the environment they may encounter following one of these emergencies.

2.3.1. **Hurricanes**. The hurricane (figure 2.1), also called a typhoon or tropical cyclone when formed in the Pacific Ocean west of the International Dateline, is by any name deadly and devastating. An Indian Ocean tropical storm in 1970 killed 200,000 in East Pakistan (now Bangladesh), according to official estimates, while unofficial estimates climbed as high as 500,000. Hurricane Camille which ravaged the Gulf Coast of Mississippi in 1969 left 265 people dead, and 55 missing, and caused $1.5 billion in damage. In 1992, the mega-storm Hurricane Andrew attacked the lower tip of Florida and the Gulf Coast of Louisiana. Twenty-three people were killed, and property damage exceeded $30 billion. In that storm, Homestead AFB was severely ravaged. Damage to just the base facilities easily exceeded $100 million (figure 2.2).

Figure 2.1. Hurricane Action.

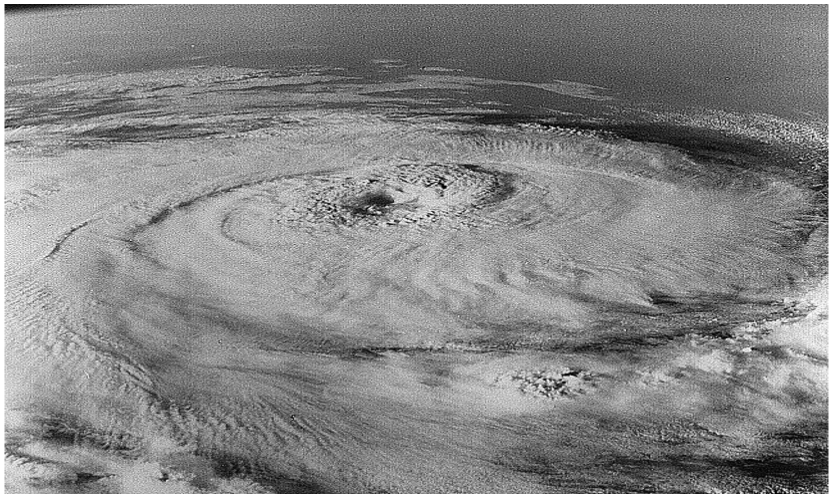


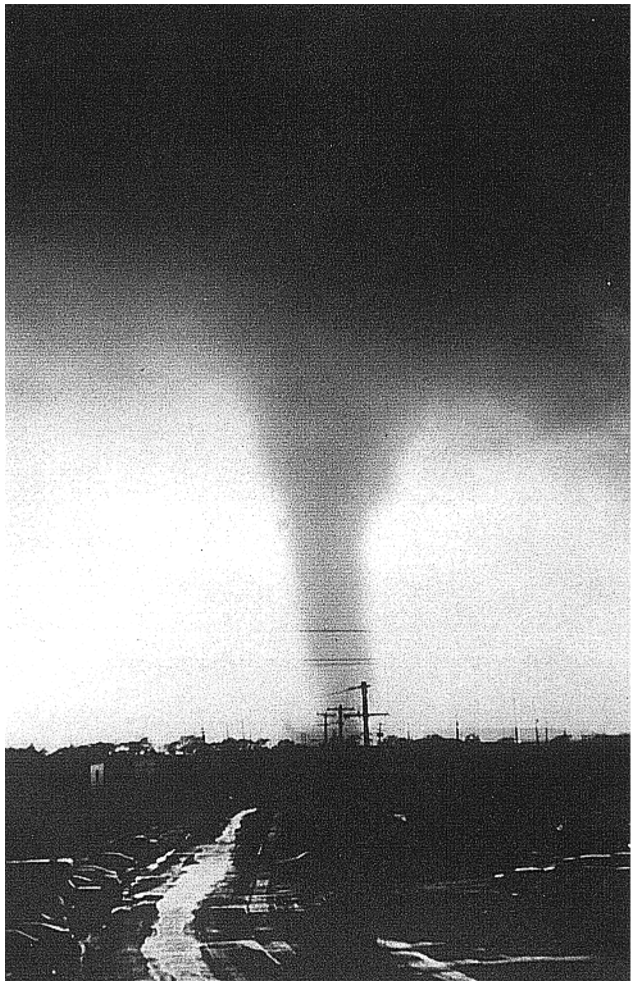
Figure 2.2. Damage to Homestead AFB.

2.3.1.1. Hurricanes originate in the warm, moist air masses of the tropics and move west and northward with enormous destructive force. The hurricane's most devastating forces are wind, torrential rains, and, most lethal of all, the storm surge. Winds, within 100 miles of the hurricane's eye, can range from 75 to 200 miles per hour. Lesser, but still destructive, winds may reach out as much as 250 miles from the center. Rainfall accompanying a hurricane is generally heavy, averaging 5 to 10 inches. Rates in excess of 20 inches in a 24-hour period have been observed. The extreme tide, or storm surge, which can inundate the coastline is especially hazardous. As the storm front moves inland, the heights of these hurricane tides may vary from 3- to 20-plus feet.

2.3.1.2. The destructive force of a hurricane is awesome. High tides, as well as the flash floods generated by the torrential rains, present walls of water which slam into structures with great impact. Devastating winds, accompanied by tornadoes spawned by the hurricane, create flying debris and mass destruction over a widespread area. Taking in and converting to energy a quarter of a million tons of water every second, the average hurricane generates a force equal to 500,000 atom bombs of the Nagasaki-type.

2.3.2. **Tornadoes**. Tornadoes are the most violent weather phenomena known to man. Although the areas affected by these funnel-shaped clouds are generally limited from 1/4 to 1/3 of a mile wide and seldom more than 16 miles long, the rotating velocities can reach 500 miles per hour. Additionally, air pressure within the funnel can be so low as to cause buildings to explode from the higher pressure inside the structure. These high winds and pressure differentials have made tornadoes the "number one" natural disaster killer in the United States. During the past 25 years, tornadoes have killed almost three times as many persons as hurricanes. Tornadoes have occurred in all 50 states, but are more common in the Midwest and Southeast. They have occurred outside the United States, but only infrequently. Although tornadoes have occurred throughout the year, weather conditions from April through June generally spawn the greatest number (figure 2.3). Unlike other weather disasters, the suddenness and the erratic path of the tornado seldom afford an opportunity to evacuate the danger area. For these reasons, timely warning and immediate availability of shelters become critical factors in saving lives.

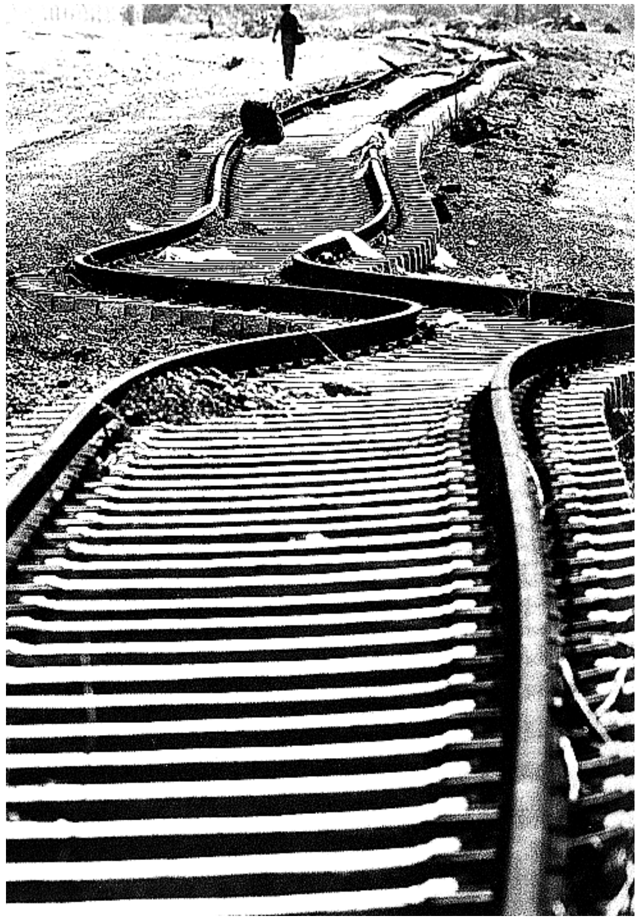
Figure 2.3. Tornado.



2.3.3 **Blizzards and Severe Cold**. Although blizzards and severe cold do not normally cause the widespread structural damage and death associated with tornadoes and hurricanes, this type weather can greatly hamper normal air base operations. The heavy snows which accompany blizzards cause many activities to grind to a halt. The build-up of ice makes roads and runways unusable as well as snaps overhead power lines. Water supply lines may freeze and rupture. Record low temperatures put a strain on heating systems, causing numerous failures that have to be repaired if operations are to continue. A significant limiting factor under these conditions will be the reduced effectiveness of people and equipment required to make repairs in an extremely cold environment. Also, reduced visibility is a "must consider" factor. People can easily get lost responding to a problem during a blizzard.

2.3.4. **Earthquakes**. Of all natural disasters, earthquakes have the potential to inflict the greatest loss of life and property (figure 2.4). A repetition of the 1906 San Francisco earthquake under current conditions would cause billions of dollars in damage and result in the loss of thousands of lives. The small 1989 Loma Prieta quake just south of San Francisco measured only 7.1 on the Richter Scale, but killed 62 people and damaged property valued over $6 billion.

Figure 2.4. Earthquake Devastation.



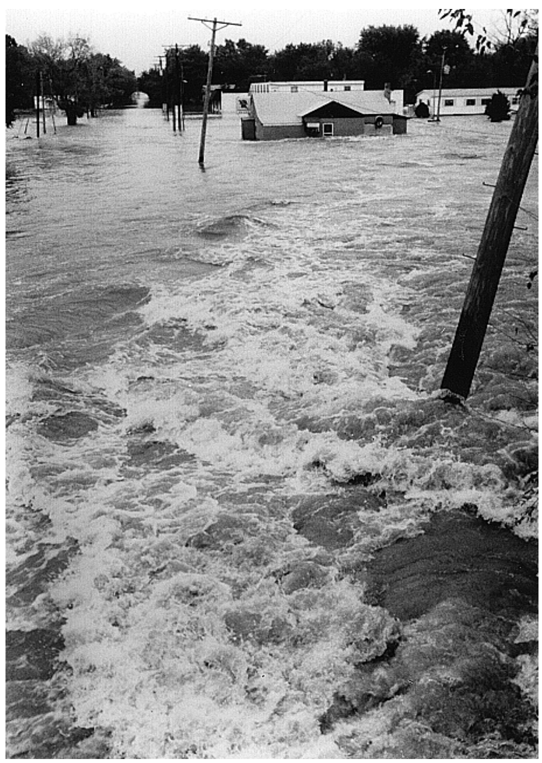
2.3.4.1. Earthquakes occur because the "solid" earth is not truly solid but is in a state of constant flux. The earth's crust is comprised of shifting layers of rock over a liquid molten core. As these blocks of the earth's crust move relative to one another, stresses accumulate until a fracture or abrupt slippage occurs. This resultant release of stress is called an earthquake. The relatively small portion of the crust at which the stresses are relieved by movement is the focus (epicenter) of an earthquake. From this point, mechanical energy, in the form of seismic waves, radiates in all directions through the body of the earth. The energy released in this movement can be enormous. For example, the Alaskan earthquake of 1964 (8.3 to 8.7 on the Richter Scale) released energy equivalent to 100 underground 100-megaton nuclear explosions.

2.3.4.2. The primary effects of earthquakes can be dramatic and devastating. Fissures develop. There can be large horizontal and vertical land mass displacements. Bridges, buildings, dams, tunnels, and other rigid structures can be sheared in two or collapse when subjected to this rapid earth movement. Water in tanks, ponds, and rivers is frequently thrown from its confines. In lakes, an oscillation sometimes occurs in which the water surges from one end to the other reaching heights sufficient to overflow its banks. During the 1964 Alaskan earthquake, this action caused water to rise 6 feet at Memphis, Tennessee, 5,000 miles from the center of the earthquake. The January 1994 Northridge Earthquake, near Los Angeles, which measured 6.6, injured more than 7,300 people, killed 56 people and caused damage exceeding $15 billion to buildings, roads, and ruptured power, water and gas lines.

2.3.4.3. Secondary effects of earthquakes are often more destructive than the earthquake itself. Landslides resulting from earthquakes in mountainous areas are frequently a major cause of lives lost. The 1970 earthquake in Peru is a case in point. During this earthquake 40,000 residents were killed when two villages were swept away by a landslide as it roared down Mt. Huascaran at 200 miles per hour. Fire damage can also increase at this time, due to loss of firefighting equipment, blockage of access routes to the fire scene, and the breaking of water mains essential to firefighting. This was demonstrated during the San Francisco earthquake of 1906, in which 80 percent of the half billion dollars in damage was due to the fires which raged out of control for days following the tremor. Other secondary effects of earthquakes include disruption of utilities, transportation, and communication systems, and the creation of tsunamis (seismic sea waves).

2.3.5. Floods. Floods can occur from any accumulation or rise of water on a land area (figure 2.5). Unusually heavy rains can run into a stream or river causing it to overflow its banks. Runoff from the sudden melting of accumulated winter snows can add great amounts of water to rivers causing flooding downstream. The heavy rains and storm surge which accompany a hurricane can cause serious flooding of low-lying coastal areas. Flooding also occurs when ice jams are formed and block the river flow. These stoppages cause flooding initially upstream, as the river backs up, and later downstream when the ice jam breaks. Man's attempts at controlling rivers can themselves lead to flooding. History is filled with disasters resulting from dam failures.

Figure 2.5. Flooding.



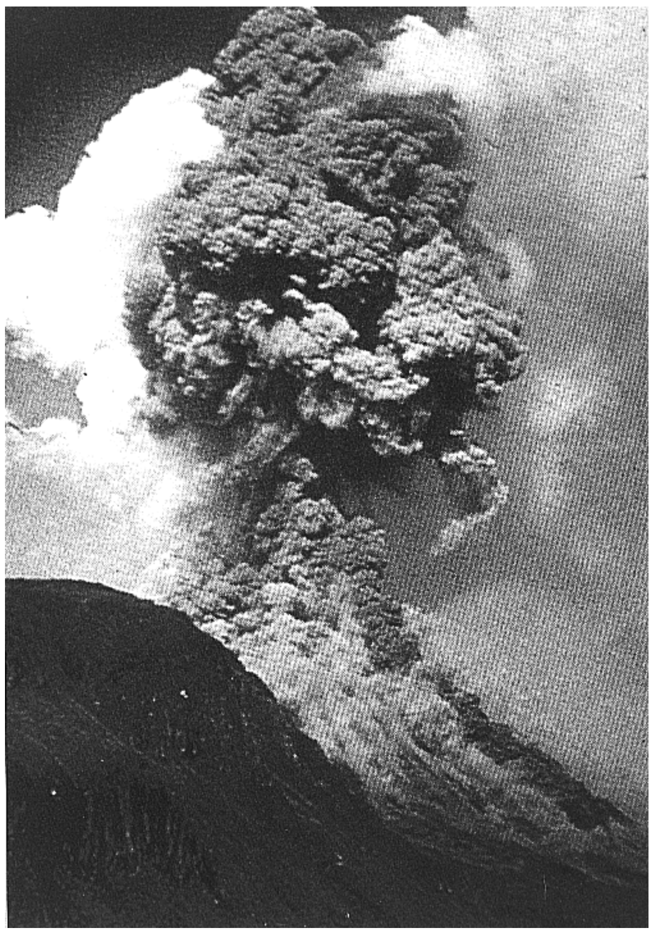
2.3.5.1. The primary effects of floods are due to inundation and the force of the currents. Floodwater and current-borne debris can drown, displace, or injure local residents. These same currents and debris can cause structural damage to bridges, buildings, and roads as well as interrupt vital utility services over a large area. Health hazards can be created through disruption of water and sanitary systems. Electrical fires can be caused by short circuits and the hazard of fire or explosion can be increased from broken gas mains. Environmental and public health hazards are created when chemical storage facilities are damaged.

2.3.5.2. Although floods may occur at any time of the year, they are more common as a result of heavy winter rains or the spring thaw of accumulated ice and snow in the United States. The warmer, more humid regions of the world often experience flooding during the monsoonal or rainy seasons. The duration of a flood's impact varies. Flash floods generally rise rapidly over a period of just a few hours and subside just as quickly, while floods in the great river basins may last for weeks. In the great flood of

1993, the Mississippi River exceeded floodstage in some areas for over 100 days.

2.3.6. **Volcanic Activity**. Volcanoes are a rare but a very potent menace. Some 80 percent of all volcanoes are contained in the "ring of fire" which circumscribes the Pacific Ocean. Active volcanoes in these areas are few in number, and the areas near most active volcanoes are sparsely populated. However, as Mount St. Helens proved in 1980 and Mount Pinatubo in June 1991, even inactive volcanoes should be considered as only dormant and a potential source of danger (figure 2.6). The Pinatubo explosion caused over $300 million in base damage at Clark AB and contributed to its closure and that of nearby Subic Naval Base.

Figure 2.6. Volcanic Eruption.



2.3.6.1. The underlying cause of volcanoes is the formation of molten rock (magma) through the process of orogenesis (mountain building). Shifting rocks are forced to great depths, where increased temperature and pressure cause them to dissolve and be converted to magma. Once formed, this magma exerts pressure on surrounding solid material. If solid material has fissures running toward the surface, molten rock will surge upward to form a volcano.

2.3.6.2. The major dangers posed by volcanic eruptions are: lava flows, airborne clouds of volcanic ash, toxic gases, and volcanic mud flows. Because of devastating forces of volcanic eruptions, reduction of damage has proved to be difficult. Lava flows may be slowed or diverted by strategically located stone barricades, but major protection involves evacuation of people and equipment to a location removed from the danger zone.

2.3.7. **Conclusions.** There are numerous other natural disasters that civil engineer units might be forced to contend with in worldwide operations. One important point should be remembered by all civil engineer people: "Never underestimate the destructive force of nature." Effective warning systems are needed, as is a mitigation plan. The plan should be designed to limit damage or casualties through pre-planned actions (i.e., site selection, permanent dikes, shelters, etc.) or expedient actions (i.e., sandbagging, tying down, shoring up, evacuation, etc.).

2.4. Man-Caused Disasters. A man-caused disaster is defined as an emergency that occurs directly or indirectly as a result of some human action. Civil engineer units may be faced with overcoming the effects of man-caused disasters that occur on-base or off-base. This section outlines potential man-caused disasters and addresses the anticipated recovery environment presented by each. The Federal Emergency Management Agency (FEMA) now refers to man-caused disasters as "technological disasters".
2.4.1. **Fire and Explosion**. Fires and explosions are closely related disasters. In many cases, a fire raging out of control in an area where flammable materials are stored can cause an explosion; or, an unexpected explosion can spread flame and hot debris over a large area causing the start and spread of a major fire (figure 2.7). While some fires, such as those caused by lightning, can be considered a natural disaster, the majority of fires start as a result of some human action.

Figure 2.7. Explosion Aftermath.

2.4.1.1. Fires can be grouped into two general categories: those involving man-made structures, facilities, or aerospace vehicles and those involving forests or grasslands. The first category can range in intensity from a small kitchen fire to a major aircraft or petroleum fire involving thousands of gallons of highly flammable material. Forest and grassland fires can be an even greater problem. They can cover thousands of acres, requiring wide dispersal of limited firefighting equipment, and resources.

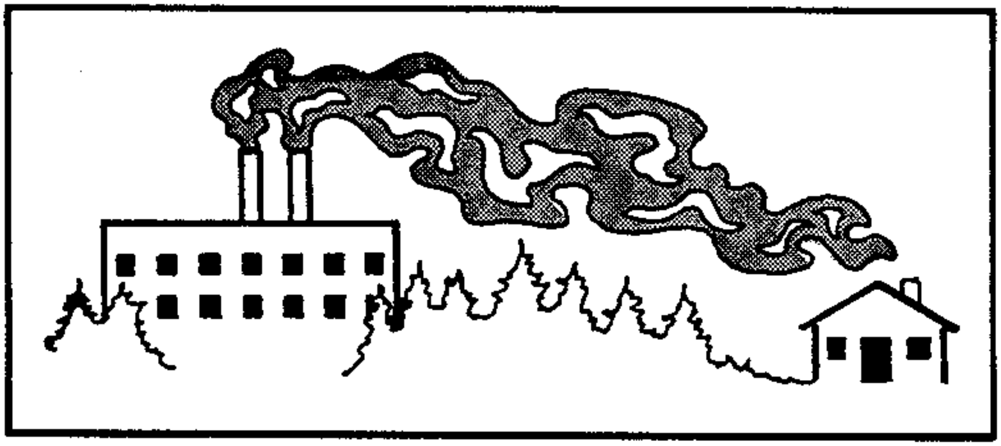
2.4.1.2. Explosions present a threat to people in the vicinity of the blast. There is danger from the force of a blast, flying debris, and intense heat and flame that may be produced by an explosion. Natural gas, liquid petroleum, and munitions storage facilities are potential explosion sites. In December 1984, a gas explosion and resulting inferno in a Mexico City suburb demonstrated the destructive force of these type disasters. A series of explosions destroyed four spherical tanks, each holding almost 500,000 gallons of liquefied gas, and sent enormous steel shards spearing into nearby houses. Flames from the blast shot more than 300 feet into the dawn sky, instantly engulfing homes and other structures which surrounded the gas plant. Subsequent blasts hurled 50-foot-long propane cylinders into the air, crushing houses as far as half a mile from the explosion site. It was several hours before firefighters could contain the flames sufficiently to enter the area. When they finally entered the zone of devastation, they found corpses carbonized in gestures of self-defense. Some were huddled together; others lay alone in their beds, arms raised in defense.

2.4.1.3. Response to a fire or explosion involves both firefighting and rescue of endangered personnel. The first step is to contain the blaze as much as possible and rescue any personnel in the area. The next step is to gain control of the fire to minimize further damage. After these tasks are accomplished, major efforts are devoted to completely extinguish the fire. Other civil engineer teams may be called on to support the firefighters. Reconstruction following a fire or explosion depends on the magnitude of the disaster, but likely it will require combined efforts of craftsmen with varying skills.

2.4.2. **Hazardous Materials and Radioactive Contamination**. If allowed to escape into the environment, toxic gases, harmful chemicals, or radioactive contaminants can pose significant hazards to man. These substances can be accidentally released into the environment at manufacturing plants, at storage facilities, during transit to another location, or at points of use. Nuclear power plants, toxic gas and chemical manufacturing facilities, and hazardous materials storage depots have numerous safeguards to prevent accidents. When these dangerous substances are transported, they are normally encased in special rupture-proof containers to prevent leakage in the event of a road or rail accident. But even with all these special precautions, accidents have and will continue to occur. When this happens, the accidental escape of these lethal substances into the atmosphere or on the ground could result in thousands of deaths.

2.4.2.1. The 1984 toxic gas leak in India serves as an example of how quickly toxic fumes can engulf and kill thousands. Methyl isocyanate, a deadly chemical used to make pesticides, began to escape from a Union Carbide plant on the outskirts of Bhopal a few minutes past midnight. Within an hour, the gas had formed a vast, dense fog of death that drifted over the city, leaving hundreds dead as they slept. As word of the cloud of poison began to spread, thousands began to flee the fumes. Many of these persons died in their desperate flight to escape the noxious vapor, while others who had inhaled the fumes died hours later from the effects, having reached what they thought was safety. By week's end more than 2,500 people were dead, and thousands more suffered permanent blindness or disabling respiratory disorders (figure 2.8).

Figure 2.8. Industrial Plant Toxic Gas Emission.



2.4.2.2. Toxic gases, harmful chemicals, and radioactive contamination can have a lasting impact on the environment. Some of these substances can render large land areas and water sources unusable for years. To minimize the effects of these toxic materials, civil engineers must be prepared to assist in containment and cleanup activities.

2.4.3. **Petroleum Spills.** Unlike the highly toxic substances discussed in the preceding section, petroleum spills are not normally life-threatening to humans even though they do present a fire hazard. However, a petroleum spill can have a devastating impact on the environment. Water supplies can be contaminated, plants destroyed, and wildlife killed or injured. Marine plants and animals are especially susceptible to the effects of petroleum spills in or near water sources and particularly our oceans. As with toxic materials, a civil engineer's primary responsibilities will be to assist in containment and cleanup activities.

2.4.4. **Major Accident**. With humans, accidents are not just possible, they are probable. Around an airbase, aircraft accidents are always a possibility (figure 2.9). Whether involving a military or a civilian aircraft, a major aircraft accident could require the assistance of civil engineers. Trained firefighting and rescue personnel could be required to extinguish fires associated with an aircraft crash and use special skills to rescue persons trapped within an aircraft. If the accident occurs in an inaccessible area, rescue and investigation teams may require the support of other civil engineer people and equipment to gain access to the crash site. However, not all major accidents will involve aircraft. The possibilities are endless. An accident can be the act which complicates a disaster by triggering an explosion, a petroleum spill, or a toxic gas leak. Major accidents require multi-unit response by the base Disaster Response Force. Minor accidents are handled by the normal emergency response functions, such as the fire department, security police, and medical services.

Figure 2.9. Aircraft Disaster.

2.4.5. **Planning for Man-Caused Disasters.** The types of man-caused disasters that could occur are too numerous to make specific plans for each. Effective planning in this area consists of evaluating the base and its surrounding area to identify activities that have potential to develop into a damaging emergency. After the evaluation, courses of action and prioritized activities should be established to reduce the seriousness of such emergencies, should they occur.

2.5. Hostile Actions. Hostile actions, although they can come from many sources, have the same basic objectives. They are intended to kill people, destroy equipment and facilities, and generally reduce the ability of a base to carry out its assigned combat mission. The following paragraphs highlight the types of attacks that are expected, based upon the current world situation.

2.5.1. **Conventional Attack.** A conventional attack can take many forms: ground forces supported by artillery and armored vehicles; airborne troops and equipment dropped behind our defenses; high speed bombers and fighters dropping bombs and firing missiles; and naval bombardments from off-shore ships or submarines. The primary objective for strikes against our air bases will be to destroy aircraft and weapons systems, command and control systems, and if that is not possible, then inflict heavy damage on runways, POL storage areas, and munitions storage facilities. This damage is intended to prevent us from being able to launch and recover combat aircraft, and it is that damage which civil engineers will be called on to fix first.

2.5.1.1. The explosion of a typical bomb or missile produces shock waves and concussion which can level structures and kill people near the point of detonation. Flying debris and bomb fragments or shrapnel can cause severe damage and injury at distances well beyond the impact point. The extreme temperatures that accompany an explosion can start major fires, particularly if flammable materials are in the proximity of an explosion. If incendiary bombs are used, their thickened burning agents will create havoc over widespread areas. Other fires may originate from shorted electrical circuits, ruptured gas lines and fuel tanks, and the spread of burning embers.

2.5.1.2. Even after an attack is over, danger still lurks in the form of unexploded ordnance. World War II history records that approximately 10 percent of all bombs dropped during an air raid failed to explode, either through some type of malfunction or because they were fused for delayed action. Also, buried and exposed mines and submunitions intentionally create a very difficult postattack environment. Regardless of reasons, civil engineer's Explosive Ordnance Disposal (EOD) and repair crews will have to function in this hazardous environment.

2.5.2. **Chemical Attack.** Often called the poor man's atomic bomb, chemical agents have been developed to kill and disable opposing forces dating as far back as the ancient Greeks. In this century, during World War I, thousands of troops were killed or seriously injured by the effects of mustard and chlorine gas as they fought in the trenches of Europe. A little known chemical war occurred in 1935-36 when one of Mussolini's Generals used lethal gas in Italy's defeat of Ethiopian forces. Herman Goering, former Marshal of Hitler's Reich, testified at the Nuremberg war crimes trial that the Germans would have used gas against the Allies in the invasion of Normandy but for the danger to horses that were a vital part of Germany's transportation system. Major General Alden H. Waitt, Chief of US Army Chemical Warfare Service at the time, estimated that German use of chemical weapons would have delayed the invasion by 6 months and made new landing points necessary. Is chemical warfare a thing of the past? Although both sides denied it, the use of chemical warfare agents was confirmed in the 1980 -1988 conflict between Iran and Iraq. Soldiers returning from the front were treated for severe burns and blisters which are common results of certain chemical agents. In some cases, whole villages were affected. Hard evidence that communist supported forces used chemical warfare to gain their objectives was seen in Laos and the Khmer Republic and by Soviet forces in Afghanistan during the 1980’s (figure 2.10).

Figure 2.10. Chemical Warfare.

2.5.2.1. How will modern chemical warfare be employed next? Chemical agents could be dispensed from large and small missiles or rockets, dropped from airplanes in canister-type bomblets, sprayed from aircraft, or dispensed by ground troops as they advance on strategic positions. Regardless of the method, the results would be the same. There would be no mushroom cloud, no devastation of the air base - only a fine mist or cloud that drifts gently over the area. It could easily be invisible, odorless, and tasteless. Perhaps people would breathe a sigh of relief at being spared from a nuclear attack or a blitz of 1,000-pound bombs and return to normal activities. Within minutes, thousands could be dying from massive seizures and convulsions, while the base and its weapons systems are left intact and undamaged.

2.5.2.2. Those who survive the initial chemical attack cannot consider themselves completely safe. Thickened chemical agents are persistent in the environment for many hours and perhaps days after an attack. Liquid chemical contaminants must be removed from the body and personal equipment before serious injury occurs. Chemical agents will also have to be removed from exposed equipment and machines as well as from areas of the base that have high levels of activity. Even after basic self protection and decontamination procedures have been accomplished, other common sense precautions should be taken. For example, the deadly vapors of chemical agents could remain trapped in air breathing equipment, such as vehicle and generator engines and air compressors, and in confined spaces. Maintenance personnel who do not consider this potential hazard in post-disaster servicing operations could be exposed to high concentrations of contaminants long after the chemical attack has subsided.

2.5.3. **Biological Attack**. Biological warfare is not new. The Black Death (plague) was transmitted to the Europeans in the 1300's when a Kipchak army, besieging a Genosese trading post in the Crimea, catapulted plague-infested corpses into the town. The British employed biological warfare against the Indians in the French and Indian War in the mid-1700's. Of all types of warfare, a biological attack is the most difficult to recognize. At first, it may seem just a routine illness such as a cold or flu. But as a lot of people begin to show the same symptoms or when those symptoms become increasingly serious and people become ill and die, people begin to realize they have been exposed to biological agents.

2.5.3.1. There are many pathogens that can be employed as biological warfare agents. The effects of these pathogens range from a minor incapacitating illness to sudden death. Biological agents can be disseminated by aircraft spray, aerosol bombs and generators, missiles, infected animals, vials, capsules, or hand dispensers. The effectiveness of biological agents depends on the targets, the nature of the military operations at the target, and the weather.

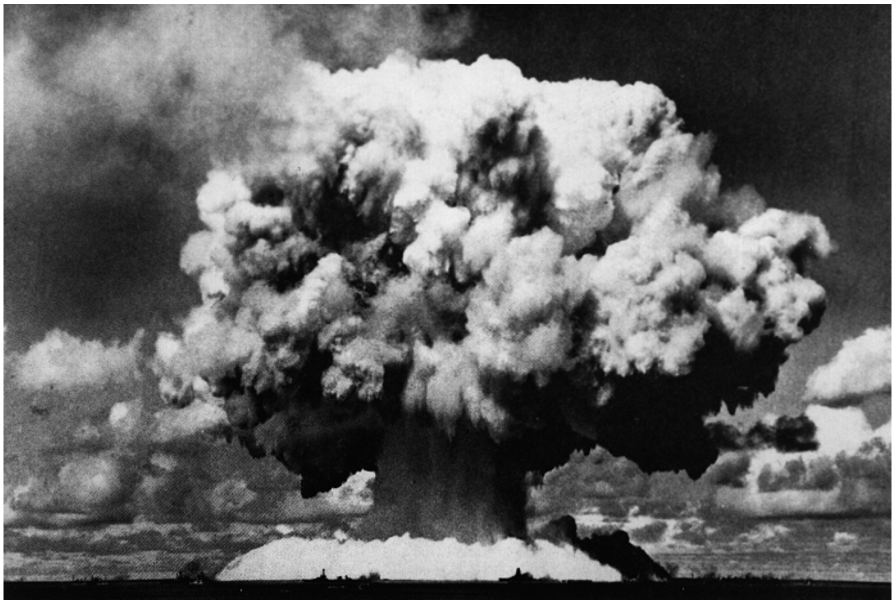
2.5.3.2. Combating a biological agent is very difficult. Since there are no suitable antidotes for the more virulent strains of pathogens, the best defense is to prevent them from entering the body through the common routes - nose, mouth, and skin. Outside of the body, these pathogens do not easily survive. They are killed by variations in temperature, lack of moisture, exposure to sunlight, and application of various germicides. One of the best defenses against pathogens is to have people don protective ensembles at the first suspicion of an attack. Maintaining good personal hygiene and physical conditioning, along with keeping your immunizations current, go a long way to prevent infections. Currently, detection of biological agents is very difficult. They are normally identified only after their effects start showing up.

2.5.4. **Nuclear Attack**. Of all of the types of attacks that may be experienced, the nuclear attack is the most awesome and frightening. A single nuclear bomb can cause more death and destruction than thousands of conventional bombs and has the additional effect of making an entire area uninhabitable for months, or even years, to come. However, with sufficient warning and appropriate precautions, the devastating effects of a nuclear blast can be reduced. The explosion of two nuclear bombs over Japan in August 1945, the first and only nuclear weapons ever used against an enemy, caused unprecedented casualties. Yet, many of these casualties could have been prevented if there had been sufficient warning to permit clearing the streets, and if the people of Hiroshima and Nagasaki had known what to expect and what to do. For example, only 400 people out of a population of almost a quarter of a million were inside the excellent tunnel shelters at Nagasaki that could have protected 75,000 people.

2.5.4.1. A nuclear explosion, like a conventional explosion, is due to the rapid release of a large amount of energy all at once. However, with the nuclear explosion, the energy results from rearrangement within the central portion, or nucleus of an atom, rather than among the atoms themselves as in a chemical explosion. Since the forces existing between protons and neutrons in a nucleus are much greater than are forces between the atoms in a molecule of chemical explosive material, the resultant release of energy is enormous.

2.5.4.2. Effects of a nuclear attack are numerous. There are extreme blast or shock waves, thermal radiation, nuclear radiation, and enormous electromagnetic energy. The blast or shock wave is the most destructive (figure 2.11). It accounts for 50 percent of the expended energy, creating tremendous over pressures and winds which can crumble buildings and other structures for a considerable distance around the detonation point. The atmosphere immediately surrounding a detonation point is raised to temperatures approaching those in the center of the sun, instantly vaporizing buildings and people in the area. This thermal radiation also has the effect of causing secondary fires and serious burns to exposed persons miles from the point of detonation. Nuclear radiation is especially intense close to ground zero. The lingering, cumulative effect of exposure to radioactive fallout can continue to cause death and radiation sickness for days, weeks, or longer following an attack. In addition, the great electromagnetic energy, generated by nuclear weapons, can temporarily disrupt radio communications and permanently damage electronic components.

Figure 2.11. Nuclear Blast.



2.5.4.3. Radioactive fallout will be the greatest danger during operations following an attack. People working in contaminated areas will have to be closely monitored for cumulative radiation doses and complete personal decontamination will have to be accomplished prior to their return to shelter areas. Additionally, the civil engineer unit will likely be called upon to decontaminate certain areas of the base so that recovery activities can proceed.

2.5.5. Terrorism. Terrorism, in the words of former Secretary of State George Shultz, is "a new kind of warfare." Considering the climate of violence in the world today, it is a warfare that is being practiced with an increasing degree of frequency. No longer the exclusive weapon of the fanatic, terrorism is now endorsed, encouraged and funded by governments in an attempt to achieve their political objectives. What once was considered the random act of a deranged personality, is now a highly organized operation, conducted with military precision, against strategic activities. Another disturbing facet of modern terrorists is their extreme devotion to furthering their cause. This aspect was gruesomely demonstrated in the attack on the US Marine compound in Beirut in 1983. The terrorist, with complete disregard for his survival, crashed a truck full of explosives through the compound fence, killing more than 200 US servicemen. This incident also demonstrated that our future protective measures will have to go beyond what would stop a reasonable man.

2.5.5.1. It is no longer safe to assume that only those exposed locations in areas of international tension are at risk. The world terrorist honors no country's borders, traveling widely to bring death and destruction to those considered as enemies. In fact, terrorists from the Middle East have boasted that even the residents of the White House should not consider themselves safe from extremist actions. "Home grown" terrorists are just as deadly.

2.5.5.2. The most frightening aspect of terrorism today is that highly technological weapons of war, once possessed only by military forces of the world's larger nations, are now available to these radical groups. What would happen if sophisticated nuclear, chemical, or biological weapons fell into the hands of these unpredictable elements? The consequences, in light of their ruthless disregard for innocent human lives, are unthinkable. The 1993 bombing of the World Trade Center in New York, the 1995 release of nerve and blister agents in the Tokyo subway, and the 1995 bombing of the federal building in Oklahoma City reinforce this point.

2.6. Military Operations Other Than War. With increasing frequency, military forces are used for operations not associated with combat. Such operations include Operation Provide Comfort following the Persian Gulf War in 1991; the peacekeeping efforts in Haiti in 1994; and the rescue, detainment, and housing of Cuban refugees during both the Muriel Boatlift in 1980 and the overwater exodus of 1994. It is difficult to deliberately plan for these operations since their requirements, timing, and location are unknown. However, the common thread in many of them is a need to beddown forces or provide a camp for refugees or disaster victims. These are activities which military forces should be able to support through normal readiness activities.

2.7. Air Force Involvement. Disasters and other crises temporarily change Air Force activities on a base--but not the priority. The mission still comes first. In a crisis, all base organizations must focus on restoring or maintaining the primary base mission, saving lives, reducing damage, and restoring mission essential resources. The nature of a crisis dictates the magnitude, the urgency, and the specific responses of the base recovery effort. In most cases prompt action is mandatory, and a team effort is required to mount an effective response. But a team effort does not just happen. The base team has to be built, equipped, trained, and exercised. The unpredictable nature of crises requires that each base and unit be prepared for a variety of circumstances. While a base cannot be prepared for every possible crisis, it can be prepared for realistic worst case scenarios. A measure of a base's preparation is its ability to quickly adapt to unplanned situations.

2.8. Civil Engineers' Role. Civil engineers play a key role on an air base. Each day, civil engineer people support more activities and units on a base than does any other organization. Not surprising then, civil engineers are involved in more pre- and post-disaster tasks than any other unit. We take the lead in emergency response planning. Engineers assist in vulnerability reduction by constructing shelters, dispersing equipment, camouflaging facilities, and much more. We assess damage, fight fires, clear hazards, provide emergency utilities, beddown military forces and disaster victims, repair facility damage, and control and monitor contamination.

2.8.1. Good civil engineer support is vital for an air base to perform its mission before, during, and after a crisis. Effective support of the air base mission requires each member of the civil engineer team to be organized, equipped, and trained to react to a variety of contingencies. This is true for everyone from the Base Civil Engineer (BCE) to the lowest ranking airman. It applies to all CE specialties including firefighting, EOD, and disaster preparedness. The civil engineer's response to disasters and other contingencies is not limited to a unit's home base. Mobile engineer forces must be capable of providing CE support anywhere in the world on short notice.

2.8.2. While civil engineers are major players, always remember that civil engineers are only part of the base team. We must work cooperatively with the other base units to plan, prepare for, and respond to peacetime emergencies, man-made disasters, and war.

2.8.3. Engineer forces must be prepared to fulfill their mission requirements across the broad spectrum of conflicts and under a full range of environments. In addition to providing essential facilities, utilities, and support whenever and wherever required to support CONUS and theater operations, CE forces will:

- Perform emergency repair of war damage to air bases.
- Support force beddown of Air Force units and weapons systems.
- Accomplish essential operations and maintenance functions for existing, as well as additional bases, facilities, and utilities.
- Provide crash rescue and fire suppression.
- Perform detection and limited area decontamination in a chemical/biological/radiological environment.
- Identify, safe, and dispose of unexploded ordnance.
- Assist in base denial, which is the functional destruction by any means available of facilities, utility systems, and equipment to deny their use to the enemy. Such action may be required if a decision is made to abandon an air base.
- Manage or oversee all repair, construction, operation, and maintenance activities conducted by Air Force, Army, wartime host nation support (WHNS), or contractor organizations on Air Force facilities and installations.
- Augment MAJCOM/NAF staffs.
- Ensure, to the maximum extent possible, that the mission is carried out in a manner consistent with national environmental policies.
- Assist in reconstitution of Harvest Falcon and Harvest Eagle assets following their use.

2.8.4. **CONUS Wartime Support.** Engineer support operations within the CONUS cover a wide range of indirect combat support activities:

- Support of deploying of aircraft and personnel during wartime.
- Reception of evacuees/casualties from overseas theaters.
- Accomplishment of predisaster tasks to minimize loss of life and facility damage in anticipation of enemy attack.
- Facility recovery, search and rescue, decontamination, and personal support services.
- Assistance to civilian authorities for Civil Defense actions when resources are available, or as directed by higher authorities.
- Minimum operations and maintenance support of mission essential facilities, utilities, and airfields.
- Support of tenant's wartime essential requirements.
- Support of forces staged in preparation for deployment.
- Aircraft crash fire rescue (CFR) and structural fire protection.

2.9. Off-Base Support. Disasters are not limited to base boundaries and neither is the Air Force response. While the base mission has first priority, the Air Force does not ignore the needs of its civilian neighbors. Historically the Air Force has been a good neighbor and provided much needed assistance when civil resources were overcome by disaster. There are numerous examples of this assistance:

December 1955 and February 1986, Beale Air Force Base helped the local communities following each flood; March 1964, Elmendorf Air Force Base assisted the city of Anchorage in the aftermath of the devastating Alaskan earthquake; August 1969, Keesler Air Force Base rapidly responded to calls for aid from Gulf Coast communities struck by Hurricane Camille; April 1982, a Prime BEEF team from Carswell Air Force Base was instrumental in reconstruction efforts after a tornado ripped through the town of Paris, Texas; and, overseas in November 1980, Air Force personnel supported rescue and recovery efforts in Avellino Province after the southern Italy earthquake. This history of support continues even today.

2.9.1. There are numerous ways by which Air Force people, equipment, and materials may become involved in providing assistance during civilian emergencies. In the United States, Air Force resources may be committed to civilian disasters or emergencies following a Presidential declaration that a disaster or emergency condition exists. The Federal Emergency Management Agency is responsible for coordinating the response of all federal agencies. FEMA makes requests for such aid through the appropriate agency channels. Requests for military assistance are made through the Department of the Army, which is the Department of Defense (DOD) Executive Agent for military support in major disasters and emergencies. If support involves Air Force resources, the Army contacts the Director of Operations, HQ USAF (AF/XOO), who is responsible for directing Air Force participation in relief operations. Air Force resources can also be committed without this prior coordination if the local installation commander deems it necessary to save lives, prevent human suffering, or mitigate great property damage. Reciprocal agreements between military and civil fire departments and agreements between Explosive Ordnance Disposal and local civil authorities are other ways that Air Force resources may become involved in off-base emergencies. At overseas locations, Air Force resources are normally committed within the context of US and host government agreements.

2.9.2. Always keep Air Force support to civilian communities in perspective. Local civil authorities are responsible for leading the response to disasters in civilian communities. The Air Force can play a support role, but does not take over. The Air Force only assists when asked and usually only when that assistance will not take away from support of the base mission. However, the Secretary of Defense can direct otherwise. The authoritative guidance on Air Force support to civil authorities is found in AFI 10-802, Military Support to Civil Authorities.

2.10. The Need For Planning. The need for predisaster and preattack planning should already be obvious to you. Why then so many words on it? Quite simply, to emphasize the need. People usually know they should make plans, but too often do not get around to it. They have good intentions, but they procrastinate. Some people, however, do not even see the need to plan. They believe they are smart enough to decide what to do on the spot. In other cases, they fail to plan because they do not recognize a potential crisis. Even worse, a few refuse to think about a potential disaster because the cost to reduce the risk is "too much". No matter the reason, the consequences--and costs--for failing to plan can be staggering.

2.10.1. **Experimental Evidence.** The results of an interesting study by psychologist Alexander Mintz help make the case for the value of planning. His study clearly showed the wide difference between planned and unplanned responses in a period of stress. His tests involved 42 experiments with 15 to 21 subjects. Experimental situations consisted of a large glass bottle with a narrow mouth into which had been inserted a number of aluminum cones. These cones were attached to strings each of which was held by one of the participants in the study. The idea was for each person to pull his or her cone out of the bottle. When emergency conditions were simulated, there was an "every man for himself" attitude and traffic jams resulted. Sometimes only one or two cones were jerked free before the rest were hopelessly snarled. As the experiment progressed, participants were given time for prior consultation and planning. This prior planning eliminated traffic jams and, in one case, all cones were removed in under 10 seconds. This simple experiment dramatically demonstrates what happens when there are no plans for possible disasters. Cones get jammed. Strings get twisted. The real life results are much more devastating--people are killed and injured; resources are destroyed; minor emergencies become major disasters.

2.10.2. **Planning Versus Panic.** After the ship Titanic hit an iceberg, Mrs. Dickinson Bishop left $11,000 in jewelry behind in her stateroom, but asked her husband to run back to pick up a forgotten muff. Another passenger grabbed three oranges and a good luck pin, overlooking $300,000 in securities he had in his cabin. Still another passenger carried nothing but a musical toy pig into the lifeboat. There are numerous cases of people who, in their haste to escape hotel fires, jump from upper floor windows located just a few feet from a fire escape. Panic causes such strange and illogical behavior, and it can undermine effective disaster response. While planning, preparation, and training may not eliminate panic, they certainly can reduce its effects.

2.10.3. **No Disaster Plan.** An example of a disaster that could have been averted with proper planning occurred in Galveston Bay in 1947. It all began with a few wisps of smoke from a cargo of fertilizer carried on board the SS Grandcamp. A crewman investigated, but even after shifting several bags of fertilizer, he could find no evidence of flame. He tried throwing several buckets of water in the direction of the smoke, with no effect. Next he tried a fire extinguisher. Still there was no effect. So he called for a fire hose. The foreman objected, since hosing down the cargo would ruin it. The captain was informed and he ordered that the hatches be battened down and the steam jets turned on. Turning on steam to fight fires is standard marine firefighting practice and has been used for many years. But this cargo of fertilizer was ammonium nitrate which becomes a high explosive when heated to about 350 degrees Fahrenheit.

2.10.3.1. Someone should have known how to deal with this explosive fertilizer. Someone should have made plans for putting out a possible fire in or near ammonium nitrate. But no one had done the necessary planning. So, at 0912 on the morning of April 16, 1947, the 10,419 ton Grandcamp and all those aboard were blown to bits. The explosion, calculated as equivalent to 1.25 kilotons of dynamite, dropped 300-pound pieces of the Grandcamp 3 miles away. The blast flattened surrounding oil refineries and chemical plants, setting off other explosions and fires.

2.10.3.2. As a result of this explosion, and the later more violent blast from another ammonium nitrate laden ship, Texas City became a scene of chaos. Although local agencies and citizens of the city worked valiantly to help the injured and reduce property damage, for the first few hours, their work was uncoordinated. There was no adequate plan for disaster.

2.10.3.3. The department head of the city's disaster organization stated that they had plans for protection against a hurricane, but not for an emergency that came without warning like this massive explosion. In fact, in a meeting to expand the disaster organization's function just 3 weeks before the explosion, people had scoffed at the idea.

2.10.4. **An Effective Disaster Plan.** An exploding ammunition ship presented South Amboy, NJ, with a similar situation as Texas City, but the New Jersey community had a disaster plan all set to go into operation. The community response force immediately executed the plan and shifted into high gear. People knew where they were supposed to go and quickly responded to their assignments. Firefighters were available to control blazes and prevent further explosions. Roadblocks were established to keep curious sightseers out and provide clear access routes for critical supplies. Effective communications and liaison channels were established between the involved agencies, as outlined in the disaster plan. Although property loss was great, loss of life was reduced and the emergency was brought under control much sooner than the Texas City disaster. The examples in this section cover peacetime disasters, but there is no less of a need to plan for the contingencies of war.

2.11. **Summary.** Crises can cover a wide range of very different situations. They may be highly localized, like a tornado or terrorist attack, or they may impact a large area, like a hurricane or nuclear attack. Regardless of how different each emergency may be, they have several traits in common. Almost all crises are very unpredictable and require prompt action if lives are to be saved and essential services restored. The descriptions of natural disasters, man-caused disasters, and hostile-actions provide an idea of the environments in which civil engineers must operate following an emergency. The discussion on the Air Force involvement in crises and the associated civil engineer's role sets the stage for more detailed discussions on CE contingency response planning.

Chapter 3

MAKING YOUR PLANS

"Planning is everything - Plans are nothing."
Field Marshall Helmuth Graf von Moltke

3.1. Introduction. Plans help us respond to crises. They help us focus our efforts so we do the right things quickly and the most important things first. When more than one person is involved, plans help us sort out who does what and when. But because crises are unpredictable, the best plans only give us a starting place from which to respond. The nature of a crisis dictates what adjustments need to be made to a planned response. Plans, operating instructions, and checklists are commonly considered the products of planning. However, as you prepare your plans, never forget that people--organized, equipped, and trained to respond to a variety of contingencies--are really the most important "product" of planning.

3.2. Overview. This chapter discusses the contingency planning activities which civil engineers can expect to perform at base level. It lists the preparations civil engineers should plan for before a crisis threatens; lists the capabilities needed to respond following a disaster, and also provides brief descriptions of the major plans which civil engineers must prepare or contribute to. In each case, the reader is referred to sources where he or she can find information to help prepare those plans. This chapter presents additional guidance on the preparation of the CE Contingency Response Plan as well as a discussion of the support civil engineers get and give to a few other base units. Formal and informal agreements which impact civil engineers are briefly discussed as are environmental protection considerations in contingency planning. The chapter touches on the need and value of checklists, discusses whose job it is to plan, and provides hints on preparing your plans.

3.3. Your Major Planning Efforts. Crises--major accidents, hostile actions, and natural disasters--are unpredictable and full of the unexpected. This unpredictability dictates that a base reduce its vulnerability and develop flexible responses in advance to ensure Air Force operations continue during war and after a disaster. Because of their significant roles in construction and base recovery, civil engineers must be heavily involved in this advance planning. This chapter outlines the contingency planning civil engineers are most often called on to do at base level and identifies documents where you can get additional information for developing plans. The focal point for CE-related contingency planning is usually the Readiness Flight.

3.3.1. Four generic lists (tables 3.1 through 3.4) may help stimulate thinking on the tasks and capabilities you need to provide for in the planning you do. One outlines predisaster preparations; the second highlights postdisaster CE response capabilities; the third lists preattack preparations; and the last one presents postattack capabilities. Do not rely solely on these lists. If you do, you may overlook important preparations or capabilities you need at your base. To further assist, the tables identify source documents where you can find more information on each topic. There are other good reference materials on many of the topics, but at least start with these sources.

Table 3.1. Predisaster Preparations.

PLAN FOR	SOURCE DOCUMENT
CE Command and Control Structure • Organization and procedures • Facilities • Communications • Continuity of operations	AFPAM 10-219, volumes 2 and 3 AFI 32-4001
Response Teams • People (notification/recall/ accountability) • Vehicles • Supplies, equipment, and materials • Communication procedures • Training	AFPAM 10-219, volumes 1 to 3
Resource Protection • Shelters (construction/stocking/ management teams) • Dispersal (people/equipment)	AFPAM 10-219, volume 2 AFMAN 32-4005
Utility System Protection • Energy Security • Utility Isolation	AFPAM 10-219, volume 2
Base Evacuation • Support for the base • Unit actions • Facility/equipment preparations • Unit individuals/families	AFPAM 10-219, volume 2

Table 3.2. Postdisaster Response Capabilities.

PLAN FOR	SOURCE DOCUMENT
Disaster Response Force Operations	AFI 32-4001 AFI 32-4002 AFMAN 32-4004
Damage and Hazard Assessment • Base wide • CE unit	AFPAM 10-219, volume 3
Emergency Response • Firefighting and crash rescue	AFI 32-2001 AFPAM 10-219, volume 3
Search and Rescue • Off-base aircraft crash • Collapsed facility • Confined spaces	AFPAM 10-219, volume 3
Hazard Clearance • Downed power lines	AFPAM 10-219, volume 3
Beddown • Sheltering disaster victims (shelters/latrines/showers) • Refugees	AFPAM 10-219, volumes 2 and 5
Emergency and Backup Utilities • Electrical (supply/generator servicing) • Water (supply/treatment/distribution)	AFPAM 10-219, volumes 2 and 3
Sanitation • Sewage disposal • Garbage disposal • Pest control (insects/rodents)	AFPAM 10-219, volumes 2 and 3
Debris Removal	AFPAM 10-219, volumes 2 and 3
Facility and Utility System Repairs	AFPAM 10-219, volume 3
Contamination Monitoring, Containment, and Control • HAZMAT response	AFI 32-4002 AFI 32-4001 AFI 32-4004

Table 3.3. Preattack Preparations.

PLAN FOR	SOURCE DOCUMENT
Air Base Operability • Contingency management center operations	AFI 10-212 AFI 32-4001
CE Command and Control Structure • Organization and procedures • Facilities • Communications • Continuity of operations • Workforce rotation/rest and relief	AFPAM 10-219, volumes 2 and 3
Response Teams • People (notification/recall/ accountability) • Vehicles • Supplies, equipment, and materials • Communication/authentication procedures • Training	AFPAM 10-219, volumes 1 to 3
Beddown • Incoming military forces • Overseas dependent evacuees • Refugees	AFPAM 10-219, volumes 2 and 5 AFI 10-404
Resource Protection • Facility/utility system redundancy • Facility/utility systems/equipment hardening • Equipment/material/people dispersal • Shelters (construction/stocking/shelter management/training)	AFPAM 10-219, volume 2 AFMAN 32-4005 AFI 10-404
Camouflage, Concealment, and Deception • Blackout/tonedown/camouflage, etc.	AFPAM 10-219, volume 2 AFI 32-4007
Security and Base Defense • Anti-terrorist protective measures • Air base defense preparations • Key CE asset/vital point protection	AFPAM 10-219, volume 2 AFI 10-404 AFI 31-101, volume 1 AFI 31-210 AFI 31-301
Utility System Protection • Energy security • Utility isolation	AFPAM 10-219, volume 2 AFI 32-4001
Base Evacuation • Noncombatant evacuation support • Support for the base • Unit actions	AFPAM 10-219, volume 2 AFI 10-404

• Facility/equipment preparations	

Table 3.4. Postattack Response Capabilities.

PLAN FOR	SOURCE DOCUMENT
Damage and Hazard Assessment • Base wide • CE unit	AFPAM 10-219, volumes 2 and 3
Emergency Response • Firefighting and crash rescue • Auxiliary Firefighting	AFPAM 10-219, volume 3 AFI 32-2001 AFI 32-4004
Search and Rescue • Collapsed facility • Confined spaces	AFPAM 10-219, volume 3
Hazard Clearance • UXO safing and clearance • Downed power lines	AFPAM 10-219, volume 3 AFI 32-3001
Rapid Runway Repairs	AFPAM 10-219, volume 4
Emergency and Backup Utilities • Electrical (supply/generator servicing) • Water (supply/distribution/treatment)	AFPAM 10-219, volumes 2 and 3
Contamination Monitoring, Containment, and Control • NBC hazards • Water supply monitoring • Limited area/CE equipment decontamination • HAZMAT response	AFPAM 10-219, volume 3 AFI 32-4001 AFI 32-4002 AFMAN 32-4006
Facility and Utility System Repairs	AFPAM 10-219, volume 3
Security and Base Defense • Work party security • Convoy defense • Counter-terrorist operations • Support of air base defense operations	AFPAM 10-219, volume 2 AFI 32-3001 AFI 31-101, volume 1 AFI 31-210 AFI 31-301
Sanitation • Sewage disposal • Garbage disposal • Pest control (insects/rodents)	AFPAM 10-219, volume 3
Debris Removal	AFPAM 10-219, volume 3
Base Denial	AFPAM 10-219, volume 3

3.3.2. While the CE unit may not be the OPR for all of the items on the generic lists, CE does have a unit responsibility for each one. This planning is necessary for an effective CE response, and the results should be included in the CE Contingency Response Plan and associated checklists.

3.3.3. Planning for any response must automatically include provisions for the people/teams, leadership, equipment, vehicles, supplies, and communications needed to perform the task. It should also include provisions for training and required support from others.

3.4. Formal Plans. Considering its worldwide commitment, it should be no surprise that there are many, many plans in the Air Force. It is not uncommon for a base to prepare over a dozen plans and to support another dozen or so. Unfortunately, there is no such thing as a standard list of plans. Major command planning requirements are not identical since the commands have different missions and geographical areas of responsibility. There are even differences between bases within a command. Consequently, it is not always easy to find the specific guidance you need. This section tries to help you through the planning jungle by highlighting the plans which civil engineers commonly use, prepare, or contribute to at a base. Depending on your location, you may not be required to use or contribute to all of these plans. Then again, you may have to prepare or use plans which are not listed. At major bases, the BCE is often tasked to develop separate civil engineer annexes or appendices to base plans. These annexes or appendices should briefly describe the support the civil engineers provide to satisfy the plans and the support CE needs from the other base organizations. Such annexes and appendices are usually supported by more detailed information in the CE Contingency Response Plan. Always contact the base OPR and refer to source documents on each plan for preparation guidelines and format. The wing plans shop often prints a synopsis of plans which apply to the wing. Major command war plans are listed in the USAF War and Mobilization Plan (WMP), volume 2.

3.4.1. **Wing Operations Plans.** Each wing prepares operations plans (OPLAN) to show how the wing will execute its taskings in support of major command OPLANs. Generally, but not exclusively, wing OPLANs cover wartime taskings. OPLANs detail how the wing will fight in support of major command or air component command OPLANs. This is mentioned to distinguish these plans from a base support plan which outlines preparations which the wing must take before hostilities and what actions must occur after hostilities to "keep the jets flying" while executing an OPLAN. The wing plans shop is the OPR for preparing warfighting OPLANs. AFMAN 10-401, *Operation Plan and Concept Plan Development and Implementation* and the major command/air component command OPLANs are the source documents for wing OPLANs.

3.4.2. **Base Disaster Preparedness Operations Plan (Base OPLAN 32-1).** At any USAF base, this is the "master" plan for the base level response to disasters and a base attack. This plan, formerly titled Base OPLAN 355-1, outlines actions and assigns responsibilities to agencies required to cope with catastrophes caused by enemy attack, natural or other disasters, or by accidents - especially those that involve nuclear or other hazardous material. This can be a very useful and versatile document. A planner can add appendices to the annexes to cover almost any disaster. A few other plans are often incorporated in this way. Civil engineers are responsible for preparing this plan, but it does require the input of many other organizations on base. A planner always needs to know what is in this plan or what should be in it if, in the unlikely event, there is not such a plan on base. This plan helps provide the basis on which to build the CE Contingency Response Plan. The directing document for Base OPLAN 32-1 is AFI 32-4001, *Disaster Preparedness Planning and Operations*. It lays out the basic requirements, but you can expect additional details from your major command.

3.4.3. **CE Contingency Response Plan.** This plan is the civil engineer's detailed guide for using and controlling the engineer forces in a disaster or contingency at a base. This plan should provide CE-specific guidance for supporting implementation of Base OPLAN 32-1 and other base level plans. Preparing this plan requires a major effort by the CE unit. A Contingency Response Plan is not required for each separate operating site at a base. Separate appendices or paragraphs within the CE plan are usually adequate. At a small base, a remote site, or an Air Force station, CE support responsibilities may be described in pertinent paragraphs of the Site Disaster Preparedness OPLAN 32-1. MAJCOMs ensure CE Contingency Response Plans are prepared for USAF-controlled bases with contracted civil engineer functions. The directive for the plan is found in AFI 10-211, *Civil Engineer Contingency Response Planning*.

3.4.4**. Base Support Plan (BSP).** This is an omnibus plan which identifies base level actions required to support major command operations plans or contingencies of any kind. A BSP is usually written to get a base and its units ready for war, but it is also used to support military operations other than war, such as humanitarian relief. Often this plan focuses on force beddown and accommodating transient aircraft, units, and people. Its purpose is to integrate all base support requirements. MAJCOMs may permit consolidation of all base-level supporting plans into the BSP. This included Base OPLAN 32-1. Total consolidation can create an unwieldy plan. To avoid duplication, the BSP may refer to other base plans. Each major command sets the plan format within their command. This is a major plan which civil engineer planners should review. CE directly contributes to many of the annexes: NBC defense operations; air base operability; EOD support; base reception; base maps; facility utilization; temporary facility plans. Engineers also provide inputs to annexes in the plan written by other units. The master source document is AFI 10-404, *Base Support Planning*. You should also refer to the plans which the BSP supports. The Logistics plans shop normally leads development of this plan. BSP requirements are included in the Joint Support Plan for a co-located operating base (COB).

3.4.5. **Base Reception Plan.** When operations plans call for the addition of forces to a USAF-controlled base, there is a need for a reception plan to outline provisions for bedding down, equipping, integrating, and using the additive forces. Civil engineers help bed those forces down, but even before that engineers help determine if existing facilities can accommodate the additive forces or if temporary facilities are required. To do that, engineers need to know how many and what types of units will be arriving, when they will be arriving, when they will be leaving if the base is serving a through-put base, and where they need to work on base. The location of any temporary facilities and utility systems can then be locked in and beddown plans prepared. This plan is normally an annex to the Base Support Plan.

3.4.6**. Civil Engineer Support Plan (CESP).** The CESP is not a stand-alone plan. When used, it is included as Annex D, Appendix 5 of unified command war plans. The CESP is not normally included in Air Force plans. The CESP identifies construction and temporary facility requirements needed to support the plan. (Temporary facilities include such items as Harvest Eagle and Falcon assets.) Extract your base's requirements from the unified plan CESP to incorporate in your base support plan. To those requirements, add local construction and facility requirements which your base will satisfy. Explain how all requirements will be satisfied and any preattack actions which must be taken by the base.

3.4.7. **Camouflage, Concealment, and Deception (CCD) Plan.** Good CCD planning and execution can confuse an attacking enemy and consequently reduce the damage inflicted on air bases. The important two words in that sentence are "good planning". You can spend a lot of time and money on CCD and not achieve the objective of confusing the enemy. Poor CCD can in fact highlight priority functions. This plan specifies what "permanent" and expedient CCD actions will be taken and who will do it. The CCD measures can be included in a stand alone plan, in the base support plan, or as an appendix to Base OPLAN 32-1. CCD is a base-wide effort, so many organizations must be involved, especially the wing tactical deception officer. The source publication is AFI 32-4007, *Camouflage, Concealment, and Deception*.

3.4.8**. Base Dispersal Plan.** This plan is intended for overseas bases subject to attack. The plan provides for relocating key assets to secure off-base locations and around the base. Provisions must be made to be able to easily recall the assets. This information can be included in the Base Support Plan or Base OPLAN 32-1.

3.4.9. **Base Denial Plan.** Overseas bases which could be attacked and overrun by an enemy force must prepare a plan to deny the use of facilities, supplies, and equipment to the enemy. The priorities and extent of denial will be decided by the commander ordering it, taking into account the potential value of the assets to the enemy. Once the order has been given, the denial of military equipment and supplies is the responsibility of the using organization. Civil engineers have a big task destroying utility systems and pavements. A plan is needed to ensure the more important items are denied first. At the many overseas locations not "owned" by the United States, denial planning is limited to denial of US-owned assets only. This plan is directed by theater OPLANs. The denial plan may be incorporated into the Base Support Plan, Base OPLAN 32-1, or a warfighting OPLAN. The source document in Europe is USAFEP 28-2, *War Planning*.

3.4.10**. Joint Support Plan (JSP).** If you are deploying to an overseas base which is operated by the host nation, you need to read the joint support plan for that base. The plan outlines, among other things, what part of the base and what facilities are available to deploying Air Force forces. The plan also specifies who is responsible for what tasks and who provides what support. Usually these plans are prepared by the theater major command (in USAFE by Regional Support Groups). If planning is tasked to an Air Force support base, the OPR for this plan is usually the logistics plans shop. In that case, the support Base Civil Engineer may be tasked with providing inputs similar to those for a Base Support Plan. The JSP should also be available from the gaining theater MAJCOM civil engineer readiness shop. Copies may also be available, but probably in very limited numbers, from the reception team provided by the gaining command's sponsor base. The source documents for this plan in Europe is USAFEP 28-2.

3.4.11. **Survival, Recovery, and Reconstitution Plan (SRR Plan 8044).** This plan (formerly numbered the SRR Plan 55) provides guidance to improve survivability of the strategic forces and to enhance the recovery and reconstitution of those forces in the event of a nuclear attack on Air Force bases which have strategic weapon systems. As with all war plans, civil engineers are tasked with providing the facilities, utilities and services needed to support the base mission. Also, if called for in the plan, some of the civil engineers may deploy with members of other base units to dispersal bases. Then, if the main base is attacked and cannot support the mission, the deployed force is in a position to try to recover and reconstitute the strategic assets at undamaged dispersal bases. The deployed engineers provide as much wartime CE support--utility operations, damage assessment and repair, weapons safing, NBC monitoring, firefighting and crash rescue, etc.--as they have capability. Because many dispersal locations are at civilian airfields, civil engineers may be able to get support from civil resources. That support often requires prior agreements. Only bases with an SRR tasking prepare this plan. The wing plans shop normally leads the base level planning for this one. The US Strategic Command Directive 8044 and your major command's supporting plan are the source documents for the base-level plan.

3.4.12. **Installation Security Plan. This** plan outlines the responses the base should take when priority assets are threatened. In peacetime, the primary threat is terrorist activities. Other scenarios include riot, civil disturbance, sniper, and hostage situations. Civil engineers are called on to support this plan in many ways. EOD people may be called on to safe a bomb. Firefighters may help disperse agitators by using fire trucks to "hose" them down. Heavy equipment may be used to block access to priority resources. Critical facilities need to be hardened and traffic barriers constructed. Fences and alarm systems may need to be installed and repaired. The security police are the OPR for this plan. The source document is AFI 31-101, volume 1, *The Physical Security Program*.

3.4.13. **Resource Protection Plan.** Similar in purpose to the Installation Security Plan, this plan provides for protection of non-priority assets. CE support is essentially the same. At bases with priority assets, the provisions of this plan are often incorporated into the Installation Security Plan. Under this plan, all base units including civil engineers should make provisions to protect unit assets (equipment, vehicles, supplies, etc.). Civil engineers need to make sure key features of the base utility systems are not easy targets. Such features include transformer stations, wells, water treatment facilities, pump houses, etc. Instructions for this plan come from AFI 31-209, *The Air Force Resource Protection Program*.

3.4.14. **Base Defense Plan.** Overseas bases which are subject to a ground-based threat also have to prepare a Base Defense Plan. Civil engineers may be tasked to provide manpower for the base defense force. Certainly CE would be called upon to help plan and construct defensive fighting positions. The security police develop this plan. The directing document is AFI 31-301, *Air Base Defense*.

3.4.15. **Stop Alert Plan.** If you have aircraft at your base, you have a Stop Alert Plan. It dictates how the base responds to prevent unauthorized movement, theft or hijacking of aircraft. It also outlines how the base may assist aircrews of hijacked aircraft from other locations. The civil engineer role is usually limited to support from the fire department which can use their vehicles to block the movement of the aircraft and EOD to counter any explosive devices that the highjacker may use. The lead for this plan is the Operations Support squadron. Their basic guidance comes from AFI 13-207, *Preventing and Resisting Aircraft Piracy (Hijacking)*.

3.4.16. **HAZMAT Emergency Planning and Response Plan.** AFI 32-4002, *Hazardous Material Emergency Planning and Response Compliance*, requires installations to prepare a plan which outlines how the base responds to the spill of hazardous materials, other than nuclear and explosives. While the Base Civil Engineer is responsible for the HAZMAT Plan, it requires the active support of many base organizations. Rather than a stand alone plan, it can be incorporated as an appendix in the Base OPLAN 32-1. At overseas installations, the guiding document for this plan is AFI 32-7006, *Environmental Program in Foreign Countries*. This plan will be familiar to some people by its previous title, the Base Spill Prevention and Response Plan.

3.4.17. **Energy Contingency Plan.** Also called the Energy Security Plan, this plan is developed to ensure electrical power remains available to priority mission users during and following a disaster. Many direct mission support functions on an airbase, such as aircraft maintenance and air traffic control, are absolutely dependent on electrical power. Civil engineers have the job to supply it. If other organizations cannot support the flying mission due to lack of power, then CE is not doing its job either. This CE prepared plan outlines methods to protect the power system, to establish independent sources, and to provide power, including emergency backup, on a mission priority basis. The details of this plan are often included in the CE Contingency Response Plan. The source document for this plan is AFI 10-211.

3.4.18. **Base Deployment Plan/Wing Mobility Plan.** For bases and units with a mobility commitment, a deployment plan (sometimes called the wing mobility plan) is prepared to detail the responsibilities of getting base units ready to deploy. Base units, including the CE Prime BEEF teams, usually prepare attachments to the base/wing plan which are called mobility operating procedures or deployment procedures. Those procedures and associated checklists specify who goes, what to take, where to assemble, what to brief, who does what, etc. RED HORSE squadrons develop their own plans, procedures, and checklists. Units will normally deploy as a part of a Core UTC Package (CUP). The unit may be either Lead or Follow-on. Ensure compliance with the requirements in AFMAN 10-401 concerning your CUP responsibilities. Generic information for deployment and mobility planning can also be found in AFI 10-403, *Deployment Planning*. Major command and base supplements are common. Additional information for CE Prime BEEF teams is contained in AFI 10-210, *Prime Base Engineer Emergency Force (BEEF) Program*, AFI 32-3001, *Explosive Ordnance Disposal Program*, the *Prime BEEF Implementation and Planning Guide*, and the *Prime BEEF Equipment and Supplies Listings* (ESL). RED HORSE guidance can be found in AFI 10-209, *RED HORSE Program*. RED HORSE deployment and employment information is also contained in the RED HORSE Concept of Operations.

3.4.19. **Emergency Action Procedures (EAP).** This is a classified document. Each level of command, including HQ USAF, delineates specific time-sensitive actions which subordinate commands are to take to prepare for war. These actions are usually packaged in the form of checklists. The specific actions vary with the level of the threat (alert condition). The actions and the method of communicating which actions are to be taken are called the Emergency Action Procedures. (Some commands may use a different term, but the product is essentially the same. For example, HQ USAFE uses Emergency Action File). Subordinate units are directed to tailor the EAP and make unit specific checklists to implement the EAP taskings. CE EAP checklists can easily be included in Annex X of the Contingency Response Plan. The wing EAP should be available within the civil engineer unit at a base. If not, contact the wing plans shop.

3.5. CE Contingency Response Plan Guidance. This paragraph offers a few thoughts on preparing and packaging the Contingency Response Plan. It contains information on plan content and format, supplementing the guidance contained in AFI 10-211. Use the standard Air Force OPLAN format which is divided into two parts: the basic plan and its supporting annexes. That format can be found in AFMAN 10-401. Attachment 3 in this document contains detailed guidelines on plan format and information to include in the Contingency Response Plan. Bases located in overseas theaters need to incorporate the Base Recovery After Attack (BRAAT) or similar concept of operation in CE contingency plans.

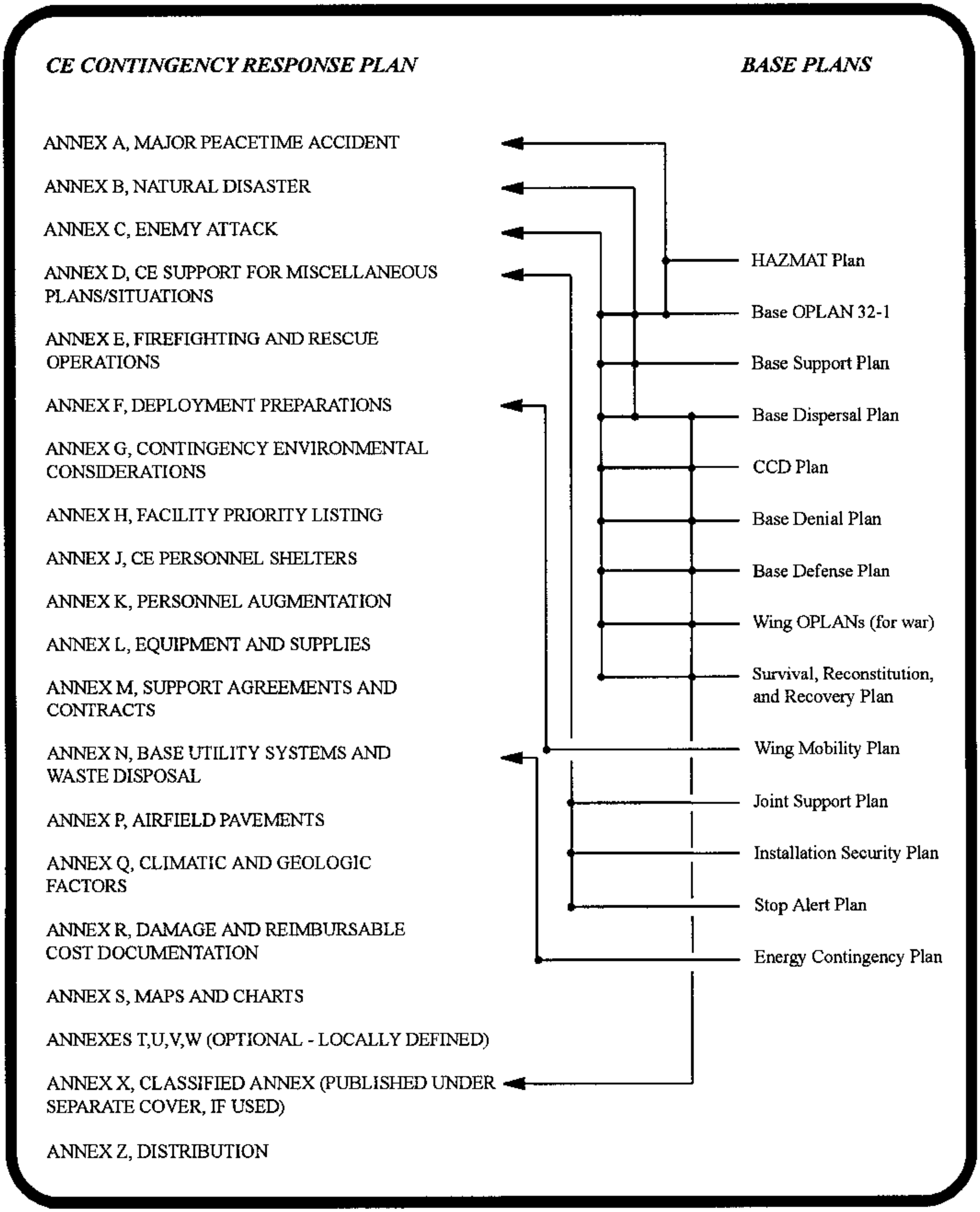
3.5.1. **The Basic Plan.** The basic plan contains seven sections: references, task organizations, situation, mission, execution, administration and logistics, and command and signal. In plan writing or editing, keep the basic plan brief. Save the details for the annexes.

3.5.2. **Supporting Annexes.** AFI 10-211 delineates the annexes which must be used for all CE Contingency Response Plans written by Air Force civil engineers. The preparation of a comprehensive set of annexes will require the majority of effort devoted to plan development.

3.5.3. **Relationship to Other Base Plans.** An effective Contingency Response Plan consolidates CE taskings which are specified in the various base plans, and it expands on those taskings with additional details. This conveniently puts all CE support requirements at one's fingertips. The Contingency Response Plan should be organized so it is easy to identify initial actions which civil engineers must take in a contingency. Figure 3.1 shows where in the Contingency Response Plan to incorporate and expand on taskings from other base plans. The solid lines show which annexes logically contain the details for support of the various plans. This recommended approach is offered to promote commonality between Contingency Response Plans. There are many possible variations, but be sure your variations are really necessary and "make sense". The example does not include a complete list of possible plans. Incorporate these and other plans in your annexes as appropriate to your base.

3.6. Support To And From Others. Your plans should document the support civil engineers provide to others and the support they are to provide to you. Much of that support is obvious and is done routinely every day. Rather than try to list those routine chores, this paragraph focuses on a few not so common tasks. This listing is a memory jogger to help you make sure you have covered these points somewhere in your planning. Some of these items apply more often to overseas Air Force installations, but not exclusively. Be sure to coordinate support you need with the supporting unit in advance. That support should also be documented in the Base OPLAN 32-1 or Base Support Plan.

Figure 3.1. CE Contingency Response Plan Relationship to Other Base Plans.



3.6.1. **Mortuary Officer.** Few contingencies or disasters would likely cause great loss of life on an airbase, but war is one. While the likelihood of a major attack on US air bases has diminished, the base mortuary officer (usually the services squadron commander) must still plan for processing and burying human remains when the number of deaths exceed the base's capability to store the remains or to ship them home quickly. The Base Civil Engineer should help the mortuary officer pre-identify burial locations. Make sure the burial sites do not create an environmental problem or interfere with other uses for the proposed sites. If interment is required, civil engineers can further help by providing equipment and operators to help dig and close the graves. EOD assists during the processing of remains by removing any explosive hazards/residue contained in the remains.

3.6.2. **Tactical Deception Officer (TDO).** The TDO works for the Operations Group Commander and has the job of developing plans to deceive the enemy about the use of base aircraft. This can involve base activities, the physical concealment of facilities, and deceptive use of facilities. A lot of units can be involved as well as civil engineers. Specific actions vary with the situation. Possible actions which engineers and others might take are presented in volume 2 of this publication.

3.6.3. **Medical Group.** Base medical services personnel are responsible for identifying medical and public health problems and for recommending corrective actions. This includes contingency response operations. Good teamwork can prevent a minor health problem from becoming a major impact to the base's mission. Some specific responsibilities of the medical unit, identified in AFI 41-106, *Medical Readiness Planning and Training* include:

- Provide professional and technical guidelines to disaster response force personnel and mobility personnel on the medical aspects of both peacetime and wartime contingency operations.
- Provide technical policy to installation commanders on protection and operations in NBC environments.
- Detect, identify, and monitor NBC conditions on installations and for medical treatment facilities and medical units.
- Conduct food and water vulnerability studies for employment sites and fixed installations overseas.
- Ensure that applicable preventive medicine guidance is provided to unit personnel for deployments and exercises.
- Verify that pre-deployment medical screening and immunization requirements for deploying personnel are identified and completed.
- Provide self-aid and buddy care training to designated unit trainers.

3.6.4. **Vehicle Maintenance.** Civil engineers really need these people. In addition to the normal in-shop support you get, you want to try to get them to provide mobile maintenance and repairs, especially for the heavy equipment. To get this, try hard to support them when they need help. For example, if you lose base power, set them up with a generator. Not only will it allow them to support the base and look good in the process, but it helps ensure your vehicles get fixed. In a contingency, contract maintenance is a possibility.

3.6.5. **Base Fuels.** An agreement with this shop to get heavy construction vehicles fueled in the field is most helpful. Field refueling can save you a lot of time and problems. If they cannot help, look into setting up your own refueling operation. This also applies to refueling emergency generators.

3.6.6**. Base Supply.** Special levels help ensure you can get your hands quickly on the critical, but little used items you need for facility and utility system repairs. Because it costs a lot of money to maintain special levels, base supply works hard to cut those levels to a minimum. A good working relationship with the supply people can help make sure they get--and keep--the items you need. There is no one-time solution to this issue. The relationship must be routinely nurtured by working together and not blaming each other when needed supplies fail to show up.

3.6.7. **Contracting.** Need supplies and equipment from local sources in a hurry? That can happen if the contracting people are cooperative. But you also need cooperation from people in base supply plus help from the base comptroller shop, so they will push the paperwork and get it to the contracting people quickly.

3.6.8. **Aircraft Maintenance.** Sometimes your tasks must be performed at night. If you run out of light carts, ask the aircraft maintenance people. They usually have more of them than anyone else on base. They also have air compressors and portable air conditioners which you may sometimes find useful. Find out the name and phone number of the person who controls the equipment. You want the lowest ranking person who can release them without having to check with someone else. When you ask for help, try to show how their cooperation will help them, because they usually will have to divert equipment from one of their maintenance activities and live with the consequences.

3.7. Formal and Informal Agreements. Sometimes formal agreements are required to "guarantee" support which is called for in a plan. Such agreements are usually prepared when support crosses major command lines, is from one country to another, or is between military and civilian authorities. A good agreement specifies what support will be provided, by who, under what conditions, and who will pay for what.

3.7.1. As a CE planner, you should know what agreements are in place at your base, how they are implemented, and how they can be adjusted or renegotiated. You should also determine if additional agreements would be helpful and worth the effort to develop. This point is important. You can spend--and waste--a lot of time developing agreements. If you run into uncooperative people during your planning and you need support from them, you better write an agreement. It is the opinion of some that formal agreements are needed only to force the bureaucratic minded into action.

3.7.2. The names of the formal agreements sometimes change, but the purpose remains the same. If you hear an unfamiliar name, ask what it is and if you have a role. The logistics plans shop is the base OPR for these agreements in almost every case. Whenever in doubt, start with them.

3.7.3. This brief discussion outlines common agreements which can impact civil engineers:

3.7.3.1. **Host Nation Support Agreement.** Sometimes the term Memorandum of Understanding is used to mean the same thing. This is a high level agreement between two countries. Rarely are base level organizations involved. However, bases may be the beneficiaries. For that reason, you need to know what support if any is provided for your base or deployment location by such agreements. Some bases have received assured host nation support for rapid runway repair and for supplies through this type of agreement. If you cannot find the answer on base, ask your major command counterpart if there are any such agreements which affect your base. Details which affect units deploying to a host nation installation can be found in the Joint Support Plan.

3.7.3.2. **Joint Support Plan (JSP).** This plan is a formal agreement between the host nation installation commander, the USAF commander who will use the facilities, and the USAF support base commander. It implements more general country-to-country agreements. Consequently, it will probably not be easy to alter the agreement, nor will it be done quickly. The terms and conditions in Joint Support Plans differ by country and by base. Guidance for this plan is theater specific. In USAFE, it is found in USAFEP 28-2.

3.7.3.3. **Mutual Aid Agreements.** These agreements are common between military bases and local civilian authorities. As the name implies, they set up arrangements where organizations with like capabilities can support each other when called upon in an emergency. The fire department, security police, and the medical group often enter into these agreements with their off-base counterparts. A major advantage to these agreements is the speed in which support can be initiated. Usually only a phone call from one organization to the other is needed. Agreements are not limited to those three functions. Arrangements for other activities, such as environmental hazard response, can also be made. While wartime support is not excluded, these agreements will most often be invoked for peacetime emergencies. The guiding document for these agreements is AFI 25-201, *Support Agreements Procedures*.

3.7.3.4. **Host-Tenant Support Agreements (HTSA).** These agreements detail the relationship between a host base and tenant units. The agreement specifies what support the host base provides to a tenant organization and the responsibilities of the tenant. Because this is a routine peacetime agreement, there is not usually much in it which applies to emergency situations other than the disaster responses which a base provides anyway. Fire protection is an example. Occasionally, however, there are units on base which have special capabilities which can be used in a disaster. It would be great to give you a list of units with special capabilities, but such a list would be inadequate at best. Here are two examples. A mobile communications installation unit has special purpose equipment which can assist in base recovery tasks: trenchers, backhoes, line trucks, etc. A mobile air combat control unit may have portable generators which could be made available. Because of their mobility commitment, you cannot count on these units being available for every disaster. But that should not prevent you from trying to get their agreement to participate when they are available. This agreement is the way to document their commitment. The authorizing document for the host-tenant support agreement is AFI 25-201.

3.7.3.5. **Inter-Service Support Agreement (ISSA).** Nearby military installations have capabilities to respond to disasters. Assuming they are not tied up with problems of their own, you may be able to call on them for assistance. Talk to your military neighbors. Find out what they can and are willing to provide. Let them know what you can do. Document your proposed support with an inter-service support agreement. In some cases, a mutual aid agreement does the same thing. Remember, however, the logistics plans shop is the OPR for any agreement. Often these agreements must be approved by your major command.

3.7.3.6. **Inter-Departmental Service Agreement.** Occasionally other federal agencies in the area have capabilities which can help your base handle an emergency. If not already provided for in a mutual aid agreement, an inter-departmental service agreement can be prepared to formalize any agreement the base can reach with the other agency. Count on additional preparation time, because this agreement must be blessed above the base level.

3.7.3.7**. Informal Agreements.** Informal agreements are probably the most useful in getting support for responding to emergencies. They are also the most common. They are quicker to produce, and a nod of the head or a handshake is enough to seal an agreement. Certainly the value of such agreements depends on the personality and integrity of the participants. But that is business as usual. True, informal agreements are easier to break than a formal agreement. But in most cases, except possibly with a foreign host, they probably achieve the same results. (Foreign hosts may be willing, but they are often severely limited as to what they can do without getting approval from higher headquarters.) Informal agreements do not have longevity. When the people who make the agreements leave, it is a dead issue unless their successors continue to embrace the agreement.

3.8. Environmental Protection Considerations. Common sense suggests a base would not write environmental impact statements to wage war, respond to aircraft accidents, or put out fires. But that same common sense should also indicate that environmental awareness is still important in those circumstances.

3.8.1. War and disasters can create unexpected environmental problems. How you choose to respond can reduce the hazards, leave them unchanged, or increase them. In crises, you sometimes do not have environmentally acceptable choices of action, but you should at least understand the consequences of your choices. Do not use an emergency as an excuse to ignore environmental considerations. That is not smart. Poor choices can affect the base immediately, such as allowing a toxic chemical spill to get into the base drinking water. As a minimum, civil engineer disaster response actions should not make an environmental problem bigger.

3.8.2. In planning for disaster and postattack responses, be sure you cover two important environmental considerations. First, be ready to deal with hazardous materials. Identify the different points on the base where you can contain the runoff of such liquids. Ideally you should construct containment devices before disasters threaten. However, at most bases this is impractical, because there are so many places where runoff leaves a base. By determining where most hazardous materials are stored or transported, you can construct containment structures in the few locations likely to do the most good. You certainly want to be sure you can keep any hazardous material from contaminating your water sources and those of your neighboring communities. That means you need to know where those sources are. Second, also be prepared to temporarily handle hazardous or contaminated solid materials in war. Identify locations where you can temporarily bury those materials so that the locations do not interfere with other base activities. You want sites which minimize ground water contamination from leaching action. Both of these actions should be covered in your HAZMAT Plan, if it is well written.

3.9. Checklists. Once a plan is written or updated, one final planning task remains--and it may be the most useful one. The CE unit should prepare or revise supporting checklists. Generally, checklists should be created for each operating instruction contained in the CE Contingency Response Plan. Checklists should also be prepared for all other CE contingency or emergency support not otherwise covered in that plan. A good checklist summarizes the tasks specified in an operating instruction or plan; gives each task (and subtask) a number; identifies the OPR (who will do the task); and states when the task or subtask should be started and/or completed (be sure to clarify which). An execution checklist format can be simple: Task Number (also number subtasks in this column); Task Description; OPR; and Timing (if needed).

3.9.1. Prepare checklists for contingency management center (CMC) positions, CE or damage control center (DCC) positions, fire alarm room operator, NBC cell positions, shops, and response teams. It is helpful to use the same or similar task descriptions for checklists prepared at every level in the unit for the same threat/emergency. It helps communication when the DCC talks to a shop about a major accident response, for example, and both have similarly numbered checklists. The tasks are more general at the control center level and more detailed at the team/shop level. If an action does not apply to a team or shop, that number is skipped in the shop checklist. Tasks can be further divided into subtasks. For subtasks, use the same task number but add a letter or number suffix, such as 2a, 2b, 2c, etc., or 2.1, 2.2, 2.3, etc. Suggestion: prepare checklists in a format similar to Emergency Action Procedures.

3.9.2. Checklists are only memory joggers. They outline tasks to be performed by each CE/Damage Control Center staff member and by each CE recovery or response team for each likely response situation. They give focus to a team's effort. They help a team to get moving quickly on a recovery task versus spending valuable time just deciding what needs to be done. Checklists are especially helpful when you do not perform a task often. They are great for pre-disaster preparations and can help keep complicated recovery efforts on track.

3.9.3. Checklist preparation involves more than one person. Each team leader should write his or her own checklists. They can include as much or as little detail as their team members need. Checklists should include such points as the tasks to be done; who will do each one; when each task must be started or completed; what equipment, tools, and vehicles should be used; and, if required, where the task is to be done. Team leaders should provide copies to the Readiness Flight. This ensures the checklists get written. The flight can then keep current copies in the CE/Damage Control Center and in the CMC. At some bases, the CMC may be called the survival recovery center (SRC) or contingency support staff (CSS). Use local exercises to check the usefulness of the checklists. Share

the best checklists up, down, and across the CE organization so everyone can improve their checklists.
3.9.4. Keep checklists current. Do not wait for a plan to be revised to update or improve checklists. You may have to update them more frequently than the plans they support because of changes in points of contact, etc.
3.9.5. For checklists which will be used outside, consider sizing them to fit into a BDU pocket and make them water resistant. Flight crew checklist binders (5 1/2" x 8 1/4") work well for this.

3.10. Whose Job Is It To Plan?
3.10.1. Every civil engineer unit must plan for disasters and contingencies. The plans for some units can be quite simple, for others they must be extensive. The number of plans and level of detail included in each will vary with each unit based on mission and exposure to disasters, contingencies, and war. This chapter focuses on the planning done by a civil engineer unit with base maintenance responsibilities. However, even CE units with only mobility commitments need to understand what planning is required, so they can better support those plans when they deploy. Table 3.5 highlights some of the planning which CE units are likely to perform or contribute to based on their location and base maintenance responsibilities.
3.10.2. Good plans cannot be written at the Pentagon or major command headquarters and mailed out for civil engineer units to put into effect. Local plans must be made using sound engineering principles, experience, and common sense. Traditionally the Readiness Flight does the CE planning, but, in fact, many people in the unit have a role. Anyone who leads a CE response team should participate and provide their inputs to each plan. Generally, the Readiness Flight guides plan development, consolidates inputs, resolves conflicting requirements, and publishes the final plan. However, the CE commander always has the option of choosing anyone in the unit to lead the planning effort for one or more of the plans. This helps spread out the workload and gets more people knowledgeable with the unit response capabilities and requirements.

3.11. Plan Development Hints. An inexperienced planner often feels a little anxious when he or she has to prepare that first plan. The anticipation is usually worse than the task. Planning does not have to be difficult. In fact, military planning can be fun if you make it a challenge worthy of your talents. Certainly the second plan will be a lot easier to prepare than the first. By that time, you will be familiar with the basic format of plans, and you will know who to see to get good information. This section offers some hints to help you develop that first plan. Attachment 4 contains a more complete discussion on plan development.
3.11.1**. The Process Is Important.** The planning process is as important as the product. As you gather information and develop solutions for your plans, you learn much about your unit's mission, capabilities, and shortfalls. That knowledge makes your unit better able to respond to crises. And as you include more people in the process, that knowledge expands throughout your unit and builds depth into your "team". Plans and checklists just document the results of the process.

Table 3.5. Typical CE Planning Responsibilities by Type of Unit.

PLAN	CONUS BCE UNIT (NOTE 1)	CE UNIT WITH ONLY A PRIME BEEF MOBILITYCOMMITMENT (NOTE 1)	OVERSEAS BCE UNIT
CE Contingency Response Plan	•		•
Base OPLAN 32-1	•		•
Emergency Action Procedures Checklists	•	•	•
Joint Support Plan			Note 2
Base Support Plan			•
HAZMAT Response Plan	•		•
SRR Plan	Note 3		Note 3

Installation Security Plan	•		•
Base Defense Plan			•
Stop Alert Plan	Note 4		Note 4
Energy Contingency Plan	•		•
Base Dispersal Plan			•
Base Denial Plan			•
CCD Plan			•
Mobility Plan/Checklists	•	•	•
Host-Tenant Support Agreements	Note 5		Note 5
Mutual Aid Agreements	•		•

NOTES 1. Mobile Prime BEEF teams could be tasked to prepare or contribute to any of these plans once deployed to a base where none exist.
2. Only at host bases when tasked by their major command.
3. Only at bases with an SRR Plan tasking.
4. Only at bases with aircraft operations.
5. Only at a base where a tenant requires CE support.

3.11.2. **Keep Plans Simple.** Good plans do not have to be elaborate, but they do have to be easy to understand. Generally, simple plans are better. They are easier to follow and more likely to be successful. No plan can cover every conceivable contingency, and experience shows that no crisis goes according to plan. You must rely on the common sense and good judgment of your people to adapt to the situation. Your planning will be adequate if your people are organized to respond to the crises, know what to do, have the resources to do it, and you can control their efforts.

3.11.3. **Answer The Key Questions.** The planning process is essentially an effort to answer a few key questions. There are many ways to phrase the "who, what, when, where, why, and how" questions.

3.11.3.1. What does the plan's OPR want from me? You want to know the purpose of the plan, what inputs he or she expects from you, and what format you should use. The OPR should be able to give you the basic plan or at least an outline of the information from the standard five sections: situation, mission, execution, administration and logistics, command and signals. If you are the OPR, you should be prepared to provide this information.

3.11.3.2. What is the threat? What contingencies do engineers need to be prepared for? You need to identify all the likely natural and man-made threats to the base and its missions. Ideally that information should be presented in the situation section of the basic plan. If not available from the OPR, review chapter one. It is a good place to start, but you also need to touch base with the wing intelligence office for terrorist and wartime threats. You should be able to get the likelihood and level of the enemy threat from them. Threats do change over time, so keep up to date. The base weather office can give you useful data on weather related emergencies. This should include the frequency and magnitude of the natural threats. Do your homework. Then give your commander your proposals on what threats you think should be included. The commander can often offer valuable insights here.

3.11.3.3. For each threat, what is likely to be targeted/damaged and how important is that function/facility to the mission? Identify the most probable targets and the most vulnerable functions and facilities for each threat. Anticipate the impact on the mission if those functions or facilities are damaged.

3.11.3.4. What permanent or temporary solutions can you employ to reduce the vulnerability of the mission-critical functions and facilities? There will never be enough money to properly protect the key facilities which you identify. Civil engineers earn their salary by figuring out how to get the most protection for the available dollars.

3.11.3.5. Based on the mission, in what priority should the base respond to recovery tasks and facility damage? This information should be updated as threats or missions change or as hardened facilities are built.

3.11.3.6. What capabilities do the civil engineers need to respond to each disaster?
3.11.3.7. What resources do you need for each response capability: people, equipment, vehicles, supplies, etc? What do you have available? Determine resource shortfalls and decide how to satisfy those shortfalls.
3.11.3.8. Who in the unit will be responsible for what tasks and what support? Establish who is to do what, with what resources and, if possible, when they are to do it.
3.11.4. **Set Up A Planning Team.** Many plans are the result of a few smart people thinking about a problem and developing common sense solutions to it. Certainly one person can prepare CE plans, but that is not a formula for success. You gain major advantages by setting up a planning team. As stated earlier, getting more people involved in the planning process yields a better informed unit. The additional brainpower tends to yield more suggestions and better solutions - and a better plan. Also, when people feel they are part of the solution, they are more willing and better able to execute the plan or provide support for it. A part-time ad hoc team works best. Team membership can change with each plan. The team does not have to meet often. In fact the team members can meet with the leader and each other only as needed to get guidance, coordinate efforts, and turn in their work.
3.11.5. **Don't Forget the "Old Timers".** Seek out the people who have been at the base or in the area a long time. Ask for their help. Some will freely share their thoughts. With others, you may have to ask a lot of questions. Almost always they have a wealth of information and invariably reveal overlooked, but important facts.
3.11.6. **The Planning Leader's Job.** The planning leader guides plan development, assigns tasks, consolidates inputs, resolves conflicting requirements, and usually drafts the plan. The leader has an obligation to improve and streamline the effort so the team does not waste time, individually or collectively. Here are some thoughts on what the leader must do.
3.11.6.1. Learn all you can about the plan you are preparing before you meet with your team. Get and read the reference materials. Have a copy of the plan to be updated. Know it thoroughly, at least your part of it. Find out what the OPR wants from you--both in details and format.
3.11.6.2. Outline your objectives for the effort. Put them on paper so you can explain them clearly to your team. Ask a friend to review them. If they are not clear, rewrite them until they are.
3.11.6.3. Identify the planning tasks which need to be done and designate the person responsible for each task. Specify the level of detail and format you expect from them. Encourage your team members to identify any additional tasks which need to be done to make the plan more complete.
3.11.6.4. Set deadlines when the tasks are to be complete. Make progress checks on the long lead-time tasks.
3.11.6.5. Encourage imagination and ingenuity. If your team members come up with a good idea, give them some time and flexibility to check it out.
3.11.7. **Minimum Alert Preparation Plan.** One common assumption in war plans is that there will be some period of warning before an enemy attacks. During this period, the base would implement the OPLAN and begin the preparations it calls for. Most planning also calls for a minimum alert preparation plan to cover the possibility that there would be very little advance notice. When planning, identify the most critical preattack preparation tasks and place them in priority order. Do this for tasks which support the entire base and those for just your unit. Highlight those tasks in your plans.
3.11.8. **Don't Plan In A Vacuum**. Civil engineers are just part of the base team. Good planning can happen only when all base units contribute. This is the only way to identify support requirements and develop agreements to provide or get that support. Be sure to coordinate your plans with organizations outside CE whenever the plans call for or modify support requirements.

3.12. Plan Updates. It is rarely necessary to totally rewrite a well-written plan, but do not assume your predecessors did a perfect job. They could have overlooked something important. Review plans on a regular basis, usually once a year, and update them when necessary. Time-sensitive material requires the most frequent updating. If such material has been properly filed by annex, appendix and tab, it is necessary only to correct those individual items. When the new material requires coordination with other agencies, use the "shotgun" method. Make enough copies to send one to each agency. Use a coordination log. This simplifies follow-up actions. Keep a record file for coordination sheets.

3.13. Sources of Information. Few people, if any, know everything needed to prepare Contingency Response Plans. Some useful documents and publications are listed here. Certainly you will find and use other sources during your planning. The experiences of others are also good sources and should be used.
3.13.1. **MAJCOM Instructions and Planning Guidance.** Major commands prepare guidance which each base in the command is expected to follow. There is no standard content or format for this guidance. Often this guidance is provided in OPLANs. A CE planner can spend a lot of time and energy trying to find out if there even is any special major command guidance. If you are not already a member of the CE Readiness Flight, start there to see what information they have. Two other units on base may also have command guidance, the wing plans

shop and the logistics plans shop. Call your major command CE readiness people and ask them to give you a list of current command guidance and instructions. If you cannot locate the written guidance at your base, then ask the command people to send copies to you.

3.13.2. **War Plans/OPLANs with Associated TPFDLs/TPFDDs.** Operations plans tell where and how forces will be postured to respond to a military threat. The time- phase force and deployment listings (TPFDLs) are a good source to learn what units and how many people you will have to beddown. These plans can be found in the wing or logistics plans shops. These are not user friendly documents, so hopefully this information is already included in the base reception plan.

3.13.3**. Base Comprehensive Plan.** Component Plan O (Contingency Plan) of the comprehensive plan contains information on land use which can be helpful when updating other base and unit plans. This component plan should address issues such as wartime disposal of toxic wastes, human wastes, and solid refuse. This plan reflects the results of other contingency planning.

3.13.4. **AFI 10-209, *RED HORSE Program*.** Provides guidance for the organization and use of the civil engineer heavy repair RED HORSE squadrons.

3.13.5**. AFI 10-210, *Prime Base Engineer Emergency Force (Prime BEEF) Program*.** Provides guidance on setting up and operating a Prime BEEF program with emphasis on base level activities. This document helps in preparing mobility and deployment planning.

3.13.6**. AFI 10-211, *Civil Engineer Contingency Response Planning.*** This publication establishes the requirements for each base civil engineer and CE unit commander to plan and prepare for responding to disasters and other contingencies. This is a "must read" document for anyone who has the task of providing civil engineer inputs for any of the base level disaster response or operations plans. This AFI contains details found in no other document.

3.13.7. **AFI 10-212, *Air Base Operability Program*.** This instruction outlines the Air Force Air Base Operability program and the relationships and responsibilities at base level to enable a base to continue operations in wartime. Be sure to read this instruction before preparing civil engineer inputs concerning wartime base recovery and peacetime preparations for war.

3.13.8. **AFI 10-802, *Military Support to Civil Authorities*.** Provides guidance on Air Force support to civil authorities during emergency situations. CE people need to understand the Air Force can support the civilian community. There are reporting and authorization procedures outlined, but even they can be suspended to save lives. A planner needs to read this instruction when preparing plans for off-base support.

3.13.9**. AFI 32-4001, *Disaster Preparedness Planning and Operations*.** This document sets guidance for Air Force response to natural disasters, major accidents, nuclear weapons accidents, etc. It also contains guidance on warning and notifications systems, exercises and evaluations, disaster preparedness training, and initial response to enemy attack. This is a foundation document which every planner should read.

3.13.10. **AFI 32-4002, *Hazardous Material Emergency Planning and Response Compliance*.** This document provides guidance for preventing, controlling, and containing hazardous materials spills. It also contains detailed guidance on HAZMAT training.

3.13.11**. AFI 32-4007, *Camouflage, Concealment, and Deception*.** This instruction sets the guidelines for employing camouflage and concealment techniques at a base.

3.13.12**. AFMAN 10-401, *Operation Plan and Concept Plan Development and Implementation.*** This manual is the bible for OPLAN development. The most useful parts for civil engineers are chapter 8 on format, chapter 9 on functional planning, chapter 13 on ABO, chapter 29 on CE planning, attachments 2 and 3 on format details, and attachment 5 on plan preparation checklists.

3.13.13**. AFMAN 32-4004, *Emergency Response Operations*.** This manual provides guidance on disaster response organizations, phases of response, SAFE HAVEN and SAFE Parking responses, nuclear reactor accident response, and natural disaster response. It contains sample checklists for members of the base disaster response force.

3.13.14. **AFMAN 32-4005, *Personnel Protection and Attack Actions*.** This manual provides details for the Air Force shelter program, mission-oriented protective postures, and actions to take in a chemical-biological attack.

3.13.15. **AFPAM 10-219 Series Pamphlets.** These publications provide guidelines for preparing contingency plans and organizing, equipping, training, and exercising the CE response forces; present details on measures which a base can take before a disaster or attack to protect mission critical resources and to prepare for base recovery; discuss emergency and wartime response operations; detail the rapid runway repair process; guide bare base planning; present contingency air base planning and design concepts; and highlight expedient construction procedures..

3.13.16. ***USAF War and Mobilization Plan (WMP), Volume 1, Annex S, Civil Engineer.*** The WMP and HQ USAF and MAJCOM planning documents provide mission requirements, direction, and guidelines for periods of national emergency or war. These documents also give general guidelines to aid in disaster planning. The primary audience is MAJCOM planners, but annex S provides good background information for the base level planner. The WMP can be found in the wing or logistic plans offices on an air base. The CE information is unclassified.

3.14. Summary. Preparing plans is an important step in getting civil engineers ready to respond to a crisis. The process is more important than the product. Civil engineers contribute to most plans written at a base. CE is the OPR for the Base Disaster Response Plan 32-1. Good planning is a major effort and should involve more people than just the Readiness Flight. Any one of the unit officers should be able to lead the preparation of the CE Contingency Response Plan. This chapter provides guidelines for preparing that plan and identifies other planning which civil engineers must do. A quote by British General Sir John Monash puts this chapter in perspective: "The main thing is always to have a plan; if it is not the best plan, it is at least better than no plan at all."

Chapter 4

YOUR RESOURCES

"Engineer troops without equipment are about as useful as pilots without planes."
Brigadier General Stuart C. Godfrey,1943

4.1. Introduction. While plans give focus to contingency responses, those plans are worthless unless you also have the resources to carry them out. Planning must provide for the people, supplies, equipment, and vehicles you need to conduct disaster responses, base recovery, and other military operations. There is one universal truth with regard to contingencies. You have to respond with the resources at hand. Consequently, it is only common sense to devote considerable effort to arrange for needed resources before a crisis threatens. You should also know where to turn for additional resources should a crisis exceed your in-place capabilities.

4.2. Overview. This chapter is written from a civil engineer's perspective to help you identify your requirements and obtain your resources. This is not an authoritative document on personnel, supply, transportation, or contracting systems. If you need detailed information, consult those organizations at your base. Go to the people in those units who make the extra effort to help. The purpose of this chapter is to give you enough information and plant enough ideas so that you can successfully work with those organizations.

4.3. Personnel. Plan first for using your most valuable resource and be sure your unit can take care of its people. You need good people, because the good ones often find ways to do the impossible--getting the job done even when short of resources. You have many options to satisfy your manpower requirements.

4.3.1. **In-Place Forces.** Each Base Civil Engineer has a substantial recovery force already in-place (figure 4.1). Without exception, every CE unit has many talented and dedicated people. It is these very same people who routinely perform mini-miracles when given a little direction, support, and encouragement. It is exciting to be a part of a well-led CE force and to see how much they can do when a crisis hits. These people certainly have the home field advantage, since they are immediately available, know the base, are organized, and know how to work together. They also have one other big advantage: the motivation to get their base fixed. A crisis, and especially war, dictates a different CE organizational personality than the one which exists during peace. The organization must switch from decentralized low intensity facility maintenance to focused high intensity repairs. Rarely will the number and mix of skills in the unit be ideal for the crisis at hand. However, a CE unit can improve its ability to respond by freely loaning people from one work center to another. Many repairs can be made by a skilled craftsman with the assistance of untrained, but willing helpers from other CE shops. But this works only if people are more concerned with getting the job done and less concerned with having the "right" specialties on the job.

4.3.1.1. **Military Personnel.** At CONUS bases and a few overseas bases, most CE military personnel will be assigned to mobile Prime BEEF teams. These people are subject to deploy on short notice. Consequently, there can be no guarantee these people will be available to respond to a local contingency. A prudent BCE will assess the capabilities of the remaining military and civilian personnel and then prepare plans to respond to disasters with these people.

4.3.1.2. **Civilian Personnel.** As you can see, the civilians in the BCE work force constitute a vital component of the disaster response and base recovery force. The civilian positions absolutely needed to provide an initial contingency response capability must be designated as "key" or

"emergency-essential". Key employees are those employed at CONUS locations who are vital to the mission at their current duty location or another CONUS location during a crisis situation. Emergency-essential (E-E) employees are those employed at an overseas location and are required to remain overseas during a crisis situation or who are employed at a CONUS location but are
required to deploy overseas during a crisis. The civilian personnel office will help you in designating positions key or E-E. The basic guidance for establishing key and emergency-essential positions is found in AFI 36-507, *Mobilization of the Civilian Workforce.* Do not let anyone harbor the idea a civilian position is not important if it is not coded key and essential. Disaster response may not be a condition of employment for the civilians in those positions, but experience shows they too are "critical" and many will make themselves available during and after a crisis without being specifically called. They are no less dedicated than the military workforce. There is one special wartime consideration at air bases in foreign countries. For security reasons, the locally hired civilians may not be allowed on-base following an attack. Consequently, CE military personnel must be able to perform all base recovery tasks--without the knowledge and skills of their local civilian coworkers. Additionally, you must determine whether existing agreements exempt local national employees from mobilization into their national armed forces. They too may "deploy". Before you plan on using locally hired civilian employees in an emergency, check with your civilian personnel office. Find out if there are any host nation laws you need to consider.

Figure 4.1. CE In-Place Workforce.

4.3.2. **Outside Help.** Even with the best planning and preparations, disasters can occur which overwhelm the capabilities of the CE organization. A fully manned and in-place CE force will not normally have enough people to perform all base recovery tasks as fast as needed or to operate 24 hours-a-day. There are many ways to augment the CE unit: individuals, Prime BEEF teams, RED HORSE, Army and Navy engineer units, host nation engineers, contracts. These ideas are offered to trigger your thoughts. You will no doubt think of other possibilities.

4.3.3. **Individual Augmentees.** Augmentees are available from within CE, from other base organizations, and from many off-base sources. Local augmentors have the advantage of being readily available. Off-base sources usually require longer times to marshal, and you may be asked to pay for their TDY costs. Most augmentees require training. The disaster preparedness and EOD functions have used augmentees for many years.

4.3.3.1. **The Ideal Augmentee.** The most useful augmentees usually come from within the organization. There is less hierarchy to go through to get them; they are easier to get for training; and they are generally more familiar with the mission. USAFE and PACAF CE units often look within the squadron first for EOD augmentees.

4.3.3.2. **On-Base Augmentees.** You can define requirements for and request local military augmentees from the base Resource Augmentation Duty (READY) program manpower pool which is administered by your local military personnel flight. You will compete with other base organizations for this unskilled labor, so develop and request your READY requirements early. You have to support augmentees with supervision, transportation, tools, equipment, and training. Before requesting them, decide if their muscle power is worth the extra efforts required of your people. Usually, it will be. See AFI 10-217, *Resource Augmentation Duty (READY) Program* and the military personnel flight people for additional information on this program.

4.3.3.3. **Uniquely Qualified Individuals.** Sometimes your people will know of civilian employees and military personnel in other base organizations who have especially useful skills. Do not hesitate to ask for their help.

4.3.3.4. **People From Other Bases.** For local disasters, you may be able to get help from other bases. Decide what you need in terms of skills and numbers. Then make the request to your major command by phone and follow up with a message. The major command staff will determine the source of augmentation. Depending upon conditions, these people can arrive within 2 or 3 days following your request. You can also ask for supervisory personnel. Feeding, housing, and transportation is your responsibility. This applies to both civilian employees and military personnel.

4.3.3.5. **Reserve Components.** Air National Guard (ANG) of the United States (ANGUS) and United States Air Force Reserve (USAFR) unit assigned personnel (individuals, UTC packages and/or entire units) may also be used for temporary manpower augmentation. ANGUS/USAFR members are ordered to active duty (voluntarily or involuntarily) under Secretary of the Air Force written authority through their respective gaining major command. Funds for pay and allowances are provided from the USAF Military Personnel Appropriation (MPA mandays for volunteers or direct allocations during involuntary callup) and are apportioned to each gaining command. Travel and per diem is paid from the using unit's (or major command's) operations and maintenance (O&M) account. Mandays can be made available to bring individuals and teams on board quickly. This works best if you know who you want and if that person or persons are available. Request these people by telephone (and message) through your major command.

4.3.3.6. **Civilian Overhire.** Hiring additional civilian personnel from the local economy is an option for some installations. Normally this can take 30 to 90 days: position descriptions (PDs) must be written; the positions have to be classified and graded by the civilian personnel office, and then the jobs recruited. However, the hiring process can be expedited during an emergency, and strong emphasis from the support group commander can help. The availability of local craftsmen will be your biggest obstacle. The overhire approach only works well when the local market has excess labor. Even then, the excess may or may not be in the skills you need. Keep in mind that you will have to compete for this labor with the local contractors if the disaster impacts the surrounding communities. You also must have money to pay for these people. The money can come from the CE budget, from the base budget, or from the major command.

4.3.3.7. **Mutual Aid Support.** Do not overlook your mutual aid agreements. While designed to provide immediate short term support, there may be possibilities to modify the agreement to arrange for longer term assistance. Be prepared to pay, however, for the additional help.

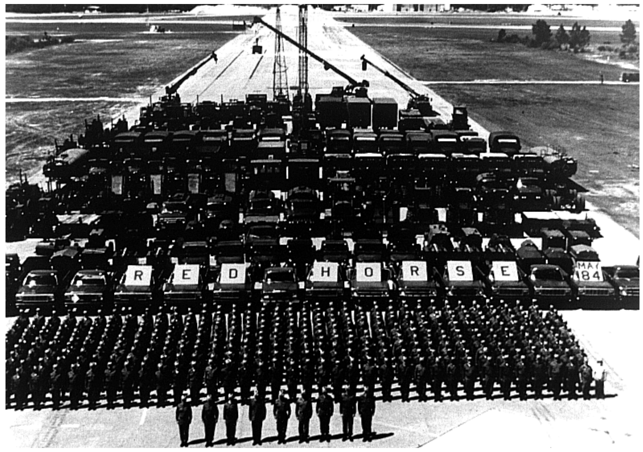
4.3.3.8. **Military Retirees and the Standby Reserve.** Active duty retirees may be ordered to active duty if the Secretary of the Air Force determines their skills are critical to mission accomplishment and not available from other military categories. Retirees do not usually deploy overseas, but replace active duty personnel who do. Standby Reserve personnel have completed all obligated or required service or have been removed from the Ready Reserve due to circumstances of civilian employment, temporary hardship, etc. These reservists maintain affiliation but are not assigned to a unit, do not perform training, and are only available during full and total mobilization.

4.3.3.9**. Individual Mobilization Augmentee (IMA).** One last source has limited application for most bases. You may be able to use IMAs during war or the mobilization period preceding war. IMAs are Selected Reserve members not assigned to an organized Reserve unit. They are normally assigned to active duty organizations to fill individual manpower requirements during contingency or wartime operations. Forward requests and justification for IMA manpower requirements to your major command counterpart. Access to IMAs for contingency operations is similar to the process used for ANGUS/USAFR unit personnel, discussed in paragraph 4.3.3.3.

4.3.4. **Prime BEEF Teams.** When you need a lot of outside help in a hurry, it would be hard to do better than having another Prime BEEF team come to help you. Assuming your major command supports your request, a Prime BEEF team can be on-site within 2 days. While you do not need to provide supervision, you do need to make arrangements for supplies, vehicle support, billeting, and messing. If necessary, a Prime BEEF team can bring their own housekeeping or home station training sets so they have a place to sleep. This is unusual, so you need to make a special request for this action. Given a contingency which occurs with limited warning, Air Force Reserve or Air National Guard Prime BEEF teams may require a longer lead time than acceptable for rapid on-scene support. However, if you are aware of such units in the local area that can and are willing to help you, include this information in the request to your major command.

4.3.5. **RED HORSE.** While you cannot write RED HORSE support into your plans, you can ask your major command for their help (figure 4.2). There are six RED HORSE squadrons: three Active, two Guard, and one Reserve. The big advantage to you is that a RED HORSE squadron is essentially self-sufficient. They have the talent, the vehicles, and heavy equipment to do major work for you. They can also support themselves. While the heavy equipment may take some time to get to your base, RED HORSE has proven they can move fast. An advance team for the 823rd RED HORSE Squadron was in place at Homestead AFB less than 24 hours after Hurricane Andrew hit the base. The follow-on team arrived within the next 2 days. This was not a miracle, just good leadership. Based on the track of the storm, they anticipated they might be needed and prepared to deploy even before Andrew struck.

Figure 4.2. RED HORSE Squadron.



4.3.6. **Army/Navy Engineers.** Do not overlook the possibility of getting help from nearby Army and Navy engineer units. Like RED HORSE, Army combat engineer units and Navy Seabees have the talent and heavy equipment to do a lot of base recovery tasks. You might informally contact these units to see if they are willing to help, but you need to formally request their assistance through your major command.

4.3.7. **Host Nation Engineers.** A few overseas bases may be able to get support from host nation engineer units. You need to find out what their capabilities are, who to contact, and what procedures are required to get their support. If the crisis affects a large area, they may well ask for your support, since you are likely to have more capability than the host nation unit does.

4.3.8. **Contractors.** Local construction companies are very good sources for engineer support. However, getting them on contract may be a challenge. Four conditions must exist to get timely contract support for crisis response. First, contractors must be available. That will be a problem if they have suffered substantially the same conditions which produced the problem on the installation. In addition, potential contractors may already be committed to the local public or private sector. So unless you make the contract worth their effort, the contractors will have no incentive to redirect their people and equipment. Second, you need some idea of what you want the contractor to do and put it in writing. This does not always mean detailed plans and specifications. Third, you need money. The contracting office has to have money or a very good promise of it to enter into a contract. Fourth, you need a good contracting office. The good ones recognize and use the flexibility given to them by the procurement regulations to provide crisis support. When the crisis is over, be sure to acknowledge the good support you got from the contracting office. This section offers three approaches to getting contract support, but the best action is to present your requirements to the contracting office and let them decide how to meet your needs. You can help by identifying possible sources. Include names, addresses, and phone numbers if you know them.

4.3.8.1**. Use Requirements Contracts.** Requirements contracts can sometimes be used to help with emergencies. This type of contract is used in peacetime when the Air Force knows what goods and services it wants but does not know exactly how much it will need during a year. A unit price is agreed upon for the contractor to perform a service or deliver goods. When you have a need for an agreed service, the Air Force puts up the money and tells the contractor how many units of service you want. These contracts are usually good for just one year and have a minimum number of units the Air Force must ask for and a maximum number the contractor has to deliver. Civil engineers have used requirements contracts to remove snow, clear debris, and paint buildings, SABER contracts are absolutely ideal for contingency support. Almost every kind of construction possible is within its scope. If you have such a contract, some of the basic provisions may already include tasks you need to help with base recovery. There is no reason you cannot include anticipated base recovery tasks. Be sure the contracting office and the contractor know those tasks are for emergencies. If possible, you do not want the minimums or maximums to apply on those items. Be fair. In an emergency which affects the civilian area as well, the price of construction materials have a way of skyrocketing. You may have to allow the contractor to recover his or her material costs in such a situation. The contractor cannot afford to subsidize the Air Force for factors beyond his or her control. If you are fair to the contractor and develop a good relationship in normal times, there is a reasonable chance the contractor will remain loyal to you during a crisis. That relationship is important, because there is practically nothing you can do if the contractor were to say he or she was already obligated and could not support your requirement. Be sure to include a list of these contracts in the CE Contingency Response Plan.

4.3.8.2. **Develop Emergency Contracts.** When no other contract is available, try to get an emergency contract to cover the situation. These will always happen faster and be better when there is a strong relationship between the engineers and the contracting office. That relationship is developed from consistent peacetime cooperation and earned trust. Command emphasis never hurts either.

4.3.8.3. Do not overlook any avenue to satisfy mission requirements. Be aware of the level of contract effort taking place on the base and understand what waivers are required to accomplish diversion. It may just involve adding a contingency clause in the "boiler plate". If you cannot find a solution working with your contracting office at base-level, ask your major command for advice.

4.3.9. **CONUS Sustaining Backfill Requirements.** When Prime BEEF mobility personnel deploy in support of major contingency operations, the losing BCE must:

4.3.9.1. Quantify the expected voids in the work force when unit mobility teams deploy. Indicate which voids contract support can fill and which will require active or reserve military backfill.

4.3.9.2. Identify and prioritize all mission-essential tasks which backfill forces must perform (for example, sewage, water and heat plant operations, emergency service call operations, disaster preparedness, EOD, fire protection, etc.)

4.3.9.3. Identify all mission-essential tasks that require special licenses and certifications (for example, water plant operations, industrial waste plant operations, fire protection, etc.).

4.3.9.4. Address the use of nondeployed active duty base personnel and critical essential civilian members to support the installation's mission.

4.3.9.5. List the minimum training the augmenting forces need to become familiar with the base's equipment and operations.

4.4. Supplies and Equipment. Even the best people need supplies and equipment to respond to crises. Traditionally CE turns to base supply or the base contracting office--before and after disasters--for those items. This section presents ideas on how to tweak each source to get the supplies and equipment you need.

4.4.1. **Situation.** The rules for getting supplies and equipment have become less rigid over the years. The Air Force is moving away from mandatory worldwide procedures and giving commanders more latitude and authority. Users, base supply, and the contracting office have far more flexibility to set up local procedures to handle local needs. Certainly there are still many Air Force instructions and manuals which apply, but they present guidelines for smart people rather than inflexible procedures. This does not mean you will not encounter the traditional by-the-book bureaucrat. Those people will always be with us, unfortunately. Look for the good people in each organization who work extra hard to find ways to get what you need. You should understand how the supply system works. In that regard, everyone should be familiar with AFM 67-1, volume 2, part 13, *Standard Base Supply Customer's Procedures* (eventually to be incorporated into AFMAN 23-110).

4.4.2**. Funding.** The increased flexibility comes with a price. More local control means more local funding. Less central funding of supplies and equipment means users must pay for more of the materials they need. This puts an added challenge on installations when preparing for contingencies. Civil engineers must divert money from their budgets to build reasonable stockpiles of supplies and equipment which they will likely need to respond to disasters. Due to limited funds, it may take engineers a few years to build the stockpiles they need. Air Force budgets do not reserve funds for peacetime emergencies or disaster relief operations. Air Force commanders must use available funds as they see fit to protect life and property. Recurring conditions present a different situation. Civil engineers can and should budget each year for supplies and equipment for snow removal and other annual events which can become crises.

4.4.3. **Determining Requirements.** A complete list of materials to stockpile for a contingency would make your job easier, but each base has different needs. The best one can do is give you some ideas and encourage you to expand on them. The first place to turn is your major command. They may already have some guidance for you, especially the overseas commands. The following approach may help in developing requirements. It looks very formal on paper. Avoid the urge to make it that way in reality.

4.4.3.1. **Timing.** The best time to determine requirements is while you are preparing or updating your plans. You already have your people involved. They are the experts. They should be able to list the materials and equipment they need to support those plans. Keep in mind, however, that individuals have a tendency to overstate requirements. Use the planning group to scrub the requirements. Each person should be able to defend his or her recommendations.

4.4.3.2. **Planning Factors.** Deciding how much of each item is needed will give you and your people fits. When possible, use planning factors. Unfortunately, civil engineers do not have analyses or real world data which reveal how much and what type of materials and equipment you will need to respond to a disaster. The requirements vary by base, by the severity of the disaster, by the solution one chooses to solve a problem, and by so many other variables impossible to count. Some planning factors and requirements are relatively easy to develop. The number of sandbags in a berm is a good example:

> The standard bag size of 4"x8"x16" yields a volume of 0.3 cubic foot per bag. Determine

the dimensions of your sandbag structure, calculate the volume of soil you need (in cubic feet), and divide by 0.3 to determine the number of sandbags required.

Most material planning factors and requirements for base recovery are very difficult to determine. In those cases, you have to make an educated guess. You may also borrow planning factors from other bases exposed to the same crises. As uncomfortable and as unprepared as you may feel, you are still in the best position to make the assumptions and to use good engineering judgment to develop your planning factors and requirements. Be kind to your successors! Document any planning factors you use in the Contingency Response Plan or in a permanent, not-to-be-retired-or-destroyed-file in the Readiness Office. At least once during his or her assignment, the readiness officer should review the planning factors to make sure they are still valid. This should be a common-sense look at them versus a detailed technical review.

4.4.3.3. **Reality Check.** After you or your people perform the calculations, you need to look at the results. Do the numbers look reasonable? Is there balance in the requirements? If not, adjust the numbers. You can get some unrealistic numbers if you blindly depend on the results of your calculations. There are no criteria to perform this assessment. The reality check is an intuitive, common sense assessment.

4.4.3.4. **Availability Check.** Once you know what and how much you need, you or your people should find out how much is already on-hand or normally available. You also need to find out what and how much is readily available through local sources. Then you will know how much you have to order for your stockpiles. The availability check does not have to be a detailed bean-counting effort. You just need a good solid appreciation for what is on hand.

4.4.3.5. **Common Items for Disaster Response.** Table 4.1 is a list of supplies commonly needed in emergencies. There are many other needed items. These are just hints to stimulate thinking. Build your own list. While not mentioned, do not forget the common shop equipment the unit uses every day, especially radios and batteries, and the specialized firefighting, disaster preparedness, and explosive ordnance disposal equipment.

4.4.3.6. **Minimum Stocks Required.** Check with your major command for required peacetime and wartime stock levels. Some examples of items which may have minimum levels include:

4.4.3.6.1. **Firefighting Agents.** AFI 32-2001, *The Fire Protection Operations and Fire Prevention Program,* details the peacetime minimum stock levels of agents for crash fire rescue vehicles and fire extinguishers. The fire chief must keep one complete recharge of agent for each crash fire rescue vehicle assigned. Check with your major command for any guidance on required wartime stock levels for AFFF and other extinguishing agents.

4.4.3.6.2. **Demolition Explosives.** Explosive Ordnance Disposal (EOD) flights are required to maintain demolition explosives according to AFI 32-3001, *Explosive Ordnance Disposal Program.* The type and quantity of explosives are listed in the EOD Equipment and Supplies Listing (ESL) for Prime BEEF mobility teams and AFCAT 21-209, *Munitions Allowances for Individual Training and Training Units* for training munitions. You also need to check major command directives. Demolition explosives listed in the ESL are configured and maintained in readily deployable condition for either air or over the road movement.

4.4.3.6.3. **Heating Fuels.** While no longer dictated by Air Force publications, major commands may specify minimum levels for solid, liquid, and gas heating fuels.

Table 4.1. Common Items for Disaster Response.

SPECIAL LEVEL IN BASE SUPPLY	ITEMS IN SHOPS OR CE STORAGE AREAS	ITEMS IN HOLDING AREA	BULK STORAGE
Large Motors Generator Parts Pesticides Fire Extinguishing Agents Pumps Transformers Aircraft Arresting System Tapes and Pendants Compressors Air Conditioning Equipment for Computer Support Tar and Roofing Materials Sandbags Demolition Explosives	Small Motors Lumber/Plywood/Glass Power Poles Insulators, Wire Plumbing Items (pipes,fittings, valves) Generator Parts Cement Pumps, Transformers Electrical Items (wire, switches, bulbs, fuzes, circuit breakers, panel boxes, etc) Ventilator fans Small Heaters Shovels, Foul Weather Gear, Binoculars Streamers/Stanchions/ Traffic Cones Surgeon's Masks Leather/Work Gloves Magnetic Compasses Field Tables/Desks Flashlights Coveralls	Sandbags Flares Nails Steel Cable Rope Emergency Lights Reflectors Tarpaulins Common Use Tools Large Plumbing Items Special Use Pumps Plastic Sheeting Small Generators	Sand Gravel Clay Select Fill (RRR) Snow & Ice Control Chemicals Salt Water Treatment Chemicals Fire Extinguishing Agent Concrete Block Brick Culverts Snow Fencing Fencing

NOTES:
- The items in each column are suggestions only. The storage location and mode (bench stock, special level, etc.) are determined at each base. Some items may appear in more than one column. Either or both areas can be used.
- The first column is suitable for high value, critical items and those with shelf-life codes.
- Columns 2 and 3 may duplicate shop bench stock, but are held in reserve for emergencies.
- The third column constitutes the only distinct effort to warehouse supplies and equipment for base contingency response separate from day-to-day operations for the BCE. To minimize cost and warehousing requirements, shelf-life items should be kept to a minimum. A complete list of these items should be included in the CE Contingency Response Plan.
- The last column is the normal mode of storage for these items.

4.4.4. **Classes of Supply.** The supply system categorizes materiel in ten classes. Those classes are listed in the USAF WMP, volume 1 and are repeated here in table 4.2.

Table 4.2. Classes of Supply.

CLASS	TITLE
1	Subsistence
2	General Support Items
3	Petroleum, Oils, and Lubricants (POL)
4	Construction and Barrier Materials
5	Ammunition

Table 4.2. Classes of Supply.	
6	Personal Demand Items
7	Major End Items
8	Medical Materiels and Medical Repair Items
9	Repair Parts (less medical repair items)
0	Mail

4.4.5. **Sources of Supply.** WMP, volume 1 also lists general sources of supplies which the military planner must consider. For convenience, those sources are listed here as well:

- In-theater peacetime operating stocks (POS)
- Accompanying supplies (those items which deploying forces take with them)
- Prepositioned War Readiness Materiels (PWRMS) at or near point of use
- Host Nation Support (HNS)
- PWRMS outside the CONUS (requires transportation to move to point of use)
- Stocks on prepositioned ships
- Wholesale stocks outside the US
- Stocks from in-theater commercial production
- CONUS stocks dedicated to a theater of operations
- Wholesale CONUS stocks
- Stock from CONUS commercial production
- Excess stock from another theater

The next paragraphs outline the sources most often used by base engineers.

4.4.6. **On-Base Stock and Stockpiles.** The first place one turns to get supplies and equipment is obviously from the stock already on-base. Experience has shown that the supplies and equipment available for day-to-day operations are often adequate for many peacetime contingencies or disaster situations.

4.4.6.1. **Base Supply Stock.** Some of the items you need in an emergency may be available on the shelves in base supply warehouses. To be responsive to customer needs, base supply attempts to keep a backup stock of high use items. Supply uses its computer to track demands on each item they handle and to develop a historic demand level. They use their stock funds to buy items they anticipate users will want, but have not yet called for. Base supply reorders items based on the demand level. That means if you use a lot of an item, they will order it in bulk and possibly often. If your consumption rate is low, they will order infrequently, and it is possible none will be on their shelves. High demand items will be more readily available because a pipeline for them has been established. The user pays for these items when issued.

4.4.6.2. **Bench Stock.** The CE bench stock is set up to support the day-to-day facility operation and maintenance activities of the CE organization. However, bench stock can be a ready source of supplies for the CE disaster response force. Bench stock puts high use, expendable items near the user rather than keeping them in the base supply warehouses. This convenience makes bench stock the first stop for supplies--after shop stock, of course. They are good sources for materials in an emergency, precisely because they include the items most commonly used every day in CE. There are many items in bench stock, but the quantities of each item are limited. That is why they can only support small disasters (figure 4.3).

Figure 4.3. Bench Stock.

4.4.6.2.1. A key feature with bench stock is that the user controls them. The using organization decides what items are added and deleted and sets the authorized level for each item. This is only fair since the user pays for the bench stock items at the time of issue from base supply even though the items are not used until a later date. Bench stock is built around shop foremen recommendations.

4.4.6.2.2. Pure contingency response items can also be added. Before you rush to do this, keep two points in mind. (1) Whatever you add, you must pay for immediately. (2) Low usage items have a way of being misplaced: usually out of neglect, sometimes from theft. When items are not used often, they are also not looked at often. This means those items may not be available when you need them.

4.4.6.2.3. Setting up a bench stock is not a one time effort. Bench stock needs to be managed. Bench stock is not refilled automatically. This is done so an organization can control the amount of money it spends on bench stock. To get replenishment, a refill demand has to be placed on base supply. A bench stock item is normally reordered when the number of items in a bin is less than 50 percent of the authorized level. The percentage is arbitrary and set by the user. It can be lower or higher and does not have to be the same for all items.

4.4.6.2.4. When a bench stock item has not been reordered for some time, the base supply computer will highlight the item as a candidate for deletion from bench stock. This is the ideal time for the organization to reassess that contingency item to make sure it is still needed. New technologies make some items obsolete. Do not eliminate a functional item just because there is a new technology, however. The review involves a little effort, which some people will pencil whip. That is how you end up with unneeded items or delete useful ones. The shop foremen should be involved in identifying requirements for contingencies. That way they will be less likely to eliminate needed items during the periodic bench stock reviews, because they know the reason they need the item. This logic applies to all contingency items and sources.

4.4.6.2.5. Probably the most practical way to improve bench stock support for emergencies is to increase the authorized levels for the items which you normally keep on bench stock. This should not be an arbitrary across-the-board increase, just for the items which your planning team anticipates your unit will need most. If an authorized level based on normal consumption is adequate to cover contingency requirements, you do not have to adjust anything. Increasing the stock levels over 2-3 years may be necessary to control costs. Bench stock is not useful for providing low demand, high value, or bulk items.

4.4.6.3. **Special Levels.** Special levels can be established in base supply to ensure that critical items are on hand in the quantities needed to support recovery from a contingency. The demand for such items usually does not warrant keeping them in bench stock, but they are essential for mission support. The user identifies the minimum quantity to be kept on hand. Do not expect supply will stock more than that number. Special levels are very important at overseas bases, especially in countries where supplies and equipment are not readily available from local suppliers. Be sure to list special level items which support contingencies in the base OPLAN 32-1. Doing so provides the authority and justification for base supply to maintain those special level items. Special level requests are made on AF Form 1996.

4.4.6.3.1. Special levels are attractive, because those items are not paid for by the user until they are issued from base supply. Supply is not particularly fond of this arrangement, because it ties up their limited stock funds. (The stock fund is not reimbursed until the user pays for an item.) This creates a natural conflict of interests. Supply cannot--and will not--indiscriminately use their stock funds to buy special level items. This means you and supply must negotiate what items and quantities will be put on special levels and what items you will have to buy outright. Focus on getting special levels for the most mission critical items and those with the longest lead times. Naturally you may want to try to get the more expensive items covered also. Use all the influence you can muster to get items on special level, but be prepared to compromise.

4.4.6.3.2. Base supply usually stores and keeps track of special level item(s), but sometimes special arrangements can be made to store selected items in the CE area. This gives you physical control, but you also have to find the room to store the items, and you have to keep track of them. This reduces the chance that supply will misplace the item and eventually get rid of it as unnecessary. That has happened. Civil engineers, however, run this same risk if the items are not clearly marked and routinely inventoried.

4.4.6.3.3. You also need to know the chief of supply has the option to establish contracts for special level items, either blanket purchase agreements (BPAs) or requirements contracts. As BPAs involve no expenditure of funds until exercised, this type of contract is most often favored by base supply. From the BCE perspective, this means that the item is not physically "on the shelf" in base supply but must be purchased when the demand is made on it. A lead time delay may be involved.

4.4.6.4. **Seasonal Items.** Some items have a higher demand at different times of the year. With such seasonal items, consumption is so irregular that the demand level does not provide satisfactory support. Working with base supply, you can make sure you have adequate stock of seasonal items on hand at the right times. This approach can help you be better prepared for cyclic conditions which can turn into an emergency such as an exceptionally heavy blizzard. You need to order these items early and keep track of their delivery status. More than one BCE have seen their winter seasonal items delivered the following spring. You may have to negotiate with base supply as to which items they will hold in their warehouses and which you must pay for up front. Some seasonal items are purchased by the user as bulk delivery items.

4.4.6.5. **Bulk Delivery Items.** Some items are logically ordered in bulk (figure 4.4). Sand, gravel, salt, rock, urea, bark-mulch, crushed sea shells, water and sewage treatment plant chemicals (including industrial water treatment), and oil absorbent are a few examples. They often find extra applications during emergency situations.

Most bulk items are ordered by sending a purchase request from the user to the contracting office. Base supply is not usually involved, because bulk items are difficult to manage. For example, it is hard to count the cubic yards in a pile of gravel and know if two yards are missing. Operating levels for each item should be reviewed periodically, and quantities should be changed when warranted.

Figure 4.4. Gravel Stockpile.

4.4.6.6. **Residual Holding Area.** This BCE holding area contains residue from work orders, and it may have items you can use in an emergency. You should not count on any specific item being there when disaster hits. The inventory changes. Occasionally some items are used for other work orders. Nothing, however, prevents you from identifying and marking items for disaster support. Using this material requires no additional funds. The unit has already paid for them.

4.4.6.6.1. You should occasionally walk through the holding area to make sure the contingency support items are still there. The BCE must keep track of what supplies and equipment are in the holding area. You can also keep track of your items by looking at the inventory sheet which is periodically updated. You definitely want the shop foremen to know what is there.

4.4.6.6.2. Be somewhat wary about mechanical and electrical equipment which are stored exposed to the elements. There is a good chance it will not work if it has been stored for a long time. If those items are important to you, have the shops periodically check and service them.

4.4.6.7. **CE Contingency Stock.** If you want to be absolutely sure you have critical supplies and equipment, you can always buy them. These items may be stored in the shops, in the residual holding area, or at any location selected by the BCE. The best way to justify buying and storing these items is to list them in the Base OPLAN 32-1 or the CE Contingency Response Plan. You should inventory these stocks periodically to make sure you still have them. Do not count on backup stock in base supply unless your unit routinely orders these items.

4.4.7. **COCESS.** The supply system is often not responsive to CE needs because of all the non-standard parts engineers deal with, unlike the aircraft on base which the supply system can support well. Civil Engineers have tried many ways to improve supply support. One of most successful is COCESS (Contractor Operated Civil Engineer Supply Store). For most CE units, COCESS is the key to getting needed supplies and equipment quickly. This is true for both routine and disaster support. Of course CE still has access to base supply, but they generally try to follow one basic rule in this case: only one source of supply for an item. Base supply does not want to handle items available through COCESS. This keeps base supply from having to tie up their stock funds to put backup items on their shelves which have low demand levels. Conversely, COCESS should not stock items which are also used by other organizations on base. Those items belong in base supply.

4.4.7.1. COCESS is essentially a requirements contract. The CE unit lists the types of supplies and equipment and approximately how much of each item it will need in a year. CE also provides a facility for the contractor. The COCESS contractor sets up a bench stock operation and gets materials for work orders. The prices for most of the items are set by the contract. There are provisions to get unanticipated materials as well.

4.4.7.2. Under COCESS, special levels can be set up. The base civil engineer can either require the contractor to stock selected items (usually done at a premium price) or ask the contractor to preidentify sources of supply that can satisfy emergency requirements within acceptable time limits.

4.4.8. **Local Vendors.** Each CE unit should be aware of the civilian suppliers in the area which possess the types of inventories that would be useful to the unit. Even with COCESS, you need this backup should your COCESS contractor fail to meet your needs. In fact, these vendors should be identified and listed in the CE Contingency Response Plan as a source of materials following an emergency. Primary concerns when dealing with off-base civilian suppliers are transportation and payment requirements.

4.4.8.1. For the supplies to be useful, they must be transported to the work area. If the civil engineer unit does not have vehicles available to pick-up the needed supplies, you may have to depend on the vendor for delivery. This can be a problem during emergencies. The vendor may not have enough trucks to transport the supplies, or the roads leading to the base from the vendor location may be impassable. It is generally not advisable to depend on the vendor to deliver supplies under emergency conditions. Base supply or transportation may be able to help.

4.4.8.2. Suppliers are normally paid by government check after receiving the bill and being assured by the receiving unit that the goods have been delivered in good condition. During emergencies a civilian supplier, especially in overseas areas, may be reluctant to accept the government's promise or check in payment for goods received. In that case, provisions will have to be made for a cash payment.

4.4.8.3. Other factors that might limit or eliminate the use of civilian suppliers are:

- Civilian resources may be damaged or destroyed from the same disaster which impacted the base.
- The civilian vendor may have previous commitments to furnish supplies to the civilian community.
- The civilian vendor may take an opportunistic approach at the time of the emergency and sell goods only to the highest bidder.
- If the emergency involves a hostile action, the civilian supplier in the overseas area may change alliances at this critical time and refuse to sell goods to the US.
- In some overseas theaters, civilian suppliers of the military may become targets of terrorists and other covert action groups.
- Overseas suppliers may also fall in the category where their inventories are essentially nationalized by their national military forces.

4.4.9. **GOCESS.** At some bases, government operated civil engineer supply store (GOCESS) is used in lieu of COCESS. While there are some procedural differences, the two operations look the same to the user.

4.4.10. **CE Mobility Equipment.** If you are short of hand tools and equipment following a disaster, do not forget your Prime BEEF team kits. There is no better reason to use them than a crisis. You should let your major command know you are no longer ready to deploy immediately if you use the Prime BEEF kits. Details of Prime BEEF team kits are contained in the Prime BEEF Equipment and Supplies Listing.

4.4.11. **War Reserve Materiel (WRM).** WRM assets, managed according to the policies contained in AFI 25-101, *War Reserve Materiel (WRM) Program Guidance and Procedures*, used to be essentially untouchable during peacetime. This has changed. Major commands set the policy for the assets under their control. With some restrictions, WRM may be used in peacetime for disaster relief, mercy missions, and humanitarian purposes (flood, earthquake, major accidents, etc.). Generally, the wing commander of the storing base can authorize the peacetime use of WRM without advance approval from HQ USAF or other approval authorities when such equipment is required for an imminent emergency of political or humanitarian significance. When this authority is exercised, HQ USAF or other approval authority must be notified promptly. If you do not have these assets on your base but you need them, ask your major command to quickly provide them.

4.4.11.1. **Prepositioned Assets.** Most WRM assets are prepositioned to place the asset as close as practicable to its point of use. Prepositioning depends on such variables and constraints as warning time, unit readiness, security of the area, terminal facilities, storage capacity, maintenance, distribution capability, and survivability. Some WRM assets are dispersed to enhance their survivability. In the event of total mobilization, airlift capability would be a limiting factor. Therefore, certain prepositioning actions have already been accomplished that will help civil engineer forces (and others) accomplish their wartime mission. For instance, both USAFE and PACAF have 1100-person Harvest Eagle (HE) housekeeping packages in storage. RED HORSE and RRR heavy equipment are also stored at several locations in Europe. In addition, USCENTAF has great quantities of Harvest Falcon (HF) equipment and vehicle fleets stored in Southwest Asia (SWA) in order to support rapid deployment forces to that part of the world. These housekeeping and heavy equipment packages have their own UTCs and are pushed to their employment locations based on OPLANs. At bases which are to receive these packages, operating instructions for setting up the assets should be written and included in the CE Contingency Response Plan.

4.4.11.2. **Rapid Runway Repair (RRR) Equipment Sets.** Prepositioning of RRR sets has increased the crater repair capability at selected overseas main operating bases (MOBs) (figure 4.5). These sets are generally located at bases vulnerable to attack, and may be deployed to other sites if needed. Prepositioning crater repair and spall repair materials and equipment has enhanced Air Force

civil engineers' ability to support the wartime flying mission.
4.4.11.2.1. The major command evaluates specific regional threats to determine RRR set requirements and appropriate levels of WRM such as crushed stone, fiberglass mats, precast concrete slabs, and spall repair materials for each base. RRR vehicle sets are covered in AFPAM 10-219, Volume 4, *Rapid Runway Repair*.

Figure 4.5. RRR Equipment.

4.4.11.2.2. RRR WRM assets must be kept serviceable at all times as directed by AFI 25-101. Several organizations (supply, civil engineer, and transportation) store and maintain portions of the RRR set. Special stock levels should be established as required by each major command to keep the RRR equipment serviced and in-commission at your base.
4.4.11.2.3. The WRM mobility section of base supply and the user must periodically inventory and inspect RRR WRM equipment and materials. While in storage, inspections are made to ensure the items are present and serviceable. After use and before being returned to stock, tools and components should be reinventoried and serviced.
4.4.11.3. **Local Housekeeping Sets.** Should you need temporary shelter for people following a disaster, you can use the 275-person housekeeping set if you have one. Housekeeping sets are fixed sets of WRM that are made to support operational needs. They contain tents, latrines, generators, and a kitchen. Allowance Standard (AS) 929 governs housekeeping set allowances.
4.4.11.4. **Other WRM (O-WRM).** Some bases are authorized to keep a special stock of supplies and equipment called Other WRM. These items do not usually directly support aircraft operations but are important to sustain wartime operations. In effect, these stocks are special levels, but they are paid for by WRM funds supplied by the major command.
4.4.12. **Home Station Training Sets.** Items in the home station training sets can be used to support emergencies. The allowance for these sets is contained in AS 429. They are authorized at CONUS units with a mobility tasking and are not WRM assets.
4.4.13. **Military Supply Points.** Military supply points are set up to put supply support closer to the user. They may be used to support Air Force activities at any contingency location where there is no base supply function. In effect, the supply point becomes a base supply to the users in those situations. Military supply points are also used overseas to support large or specialized supply items which are normally available only from a depot, located thousands of miles away and requiring weeks, or even months, to reach the requesting unit. Such supply points may serve as Queen Bee activities. For example, the 702 CES at Ramstein AB, Germany serves as a military supply point for generators

and aircraft arresting systems for USAFE units. Ask your major command if such supply points exist for CE items. (This term is more often associated with the Army, where they have to set up supply points to keep up with the mobile ground forces.)

4.4.14. **Resupply.** A few words are needed about resupply for overseas bases during wartime or major contingencies. During major crises, military supply sources may be unable to support resupply requests from all units. Main base supply organizations will rapidly exhaust their resources. Quick resupply from depots or CONUS locations is doubtful due to limited airlift availability, especially in the early stages of a conflict. During that period, aircraft will be fully involved in moving military forces and their equipment into the theater of operations. It is even less likely you will see resupply by air of the bulky construction materials civil engineers need. For these reasons, planning guidance emphasizes that overseas units should be capable of operating for 30-60 days without resupply during wartime. This gives time for the military to establish the land and sea resupply pipeline. Your major command sets the prepositioning objectives. Objectives do change, so follow your major command guidance.

4.4.14.1. Traditionally, Class IV materials are "pushed" to a theater of operation during the early stages of a conflict. The items are sent based on requirements outlined by the theater unified/joint command in its Civil Engineer Support Plan (CESP). The CESP is part of the command's OPLAN. Major command requirements are consolidated with the other US military services in theater. The requirements do not cover every possible item you may need. They provide for a variety of items within a supply class. The user then has to make do with what arrives. Eventually, with the supply pipeline operating, the resupply operation begins to accommodate "pulled" items. Those items are shipped based on specific user requests. Unless moved by air, the Air Force depends on other services to move goods from the CONUS to the theater ports and then to air bases. By itself this is not a problem. However, you may or may not get what you need. Items have a way of being diverted or stolen at the ports and at other intermediate destinations. Other units with the same requirements also compete with you for supplies. You need to play the priority game. Whenever possible, order materials against aircraft support priorities. Working with your major command, you do need to understand what Class IV supplies are available to you through the joint command and what you must do to get them. You also need to find out if there are agreements for resupply from local sources. Good host nation support will reduce your prepositioning requirements.

4.4.14.2. The need for supplies and equipment can vary greatly depending on mission, location, extent of damage, etc. In future conflicts, you can expect more flexible resupply procedures to be used. This was done during the 1990-1991 Desert Shield/Storm operations. A military supply point was set up at Langley AFB to handle Air Force requirements. The supply point had the capability to order and track material just as a base supply operation could. This unit also coordinated airlift requirements and set movement priorities. The use of computers and satellite communications allowed for very rapid ordering of supplies and equipment. Requests were often processed from the units in the middle east to vendors within a matter of hours. To speed delivery to the units, items were often shipped from the supplier directly to the final destination by Federal Express rather than by truck from the supplier to a CONUS aerial port to await transshipment by military or contract aircraft.

4.4.14.3. Even with the new technologies and procedures, engineers must still face the reality that bulky construction materials will not get high priorities for movement from the CONUS. While they may eventually be shipped by sea, civil engineers really need to develop local sources of resupply.

4.4.15. **Informal Sources.** You do have some informal sources of supply to try when little else is working. The supply sources that a civil engineer unit normally uses will be limited or nonexistent during times of disaster. Since it is during these times of limited resources that the services of the civil engineer unit are most important, no source of resupply can be overlooked. An effective salvage operation can complement the resupply network. Facilities damaged beyond repair during the emergency should always be considered sources of equipment and materials for base recovery. Another option is to cannibalize undamaged lower priority facilities to get materials to support high priority facilities. Then again you can always resort to the time tested military procedures for acquisition of materials during war: borrow, scrounge, or barter from nearby units of any service. Although many items will not be available through these methods, the innovative use of the resources that can be recovered or obtained will reduce the demands on the supply system at this critical time and hasten the recovery effort.

4.4.16. **Protect Supplies and Equipment.** When you get your materials, you also need to protect them. There are many ways to lose your supplies. Here are a few to think about.

4.4.16.1. While not wanting to dwell on it, there are always people who will steal your materials. The greater the shortage, the more your materials are at risk from midnight requisitions by on and off base military units and from civilians.

4.4.16.2. Materials can also be lost due to war damage or natural disaster. You should consider protecting your most critical materials by dispersing them or putting them in protected areas such as revetments. Unfortunately, dispersal makes it harder to keep them from being stolen.

4.4.16.3. Your biggest challenge to keeping the materials intact is the routine use of contingency stockpiles. There is a tendency to raid those stockpiles when a unit runs short of an item in its regular stock. There is nothing wrong with either practice as long as you quickly replace the stuff. Too often that is not done, usually due to a shortage of funds. Even when no disaster threatens, materials have a way of vanishing without any record. Periodic availability checks and inventories help expose these problems.

4.4.16.4. Weather-sensitive products should be monitored closely (like urea). Open storage of salt and urea should be avoided. The greatest chance for contamination of ground water is at the storage site. The weather may degrade the product, rendering it useless. Runoff from stockpiles may clog storm drains, so monitor drainage systems carefully.

4.4.16.5. Rotate stock with a shelf life. The CE logistics section should have procedures to make sure shelf-life materials do not go bad, but they need the cooperation of the shop foremen.

4.4.17. **Cost Accounting.** Certain expenditures during contingency operations are reimbursable. This makes an accurate and timely recording of costs by civil engineers important. However, the initial response phase of a contingency operation is not the time to worry about reimbursements. Take care of the situation first. The CE Contingency Response Plan should contain an operating instruction for maintenance engineering to open a work order and to notify financial management to track costs.

4.4.18. **Emergency Requisition.** Rather than cite the public laws or Federal Acquisition Regulations which change, it is sufficient for civil engineers to know that both base supply and the base contracting office have provisions for getting supplies and equipment expeditiously under emergency conditions. Check with them in advance to find out what must occur for them to use those provisions.

4.5. Vehicles. You obviously need vehicles to move your people, supplies, and equipment. You also need special equipment to perform heavy construction and base recovery tasks. The CE fleet includes both general and special purpose vehicles which are often adequate for most situations encountered during contingencies. The best way to ensure vehicles are available for a contingency is to have an active day-to-day vehicle management program and good maintenance support. That program is outlined in AFI 24-301, *Vehicle Operations*. State all your vehicle requirements in the Base OPLAN 32-1--whether you currently have them or not. Sometimes units just copy their Vehicle Authorization List (VAL) and fail to include special purpose vehicles they need for a recovery effort (be that BRAAT or natural disaster).

4.5.1. **General Purpose (GP) Vehicles.** GP vehicles form the backbone of the fleet. AS 012 lists vehicles allowed for normal operations. Getting vehicles looks easy on paper, but it is a major effort. You need to review the Allowance Standard to confirm your allowance. Then you submit a request to the transportation squadron, stating your requirement and justifying the need. The base must assign priorities to all requests. When the wing Logistics Group commander approves your request, it is sent to the major command where it competes for command priority with requirements from the other bases in the command. The major command gets funding targets from the Air Staff. The command will recommend buys from its priority list until they reach each fiscal year funding target. MAJCOM requirements are sent to the Air Staff and consolidated for fiscal year buy programs by Warner-Robbins Air Logistics Center. This process often requires annual updates and rejustifications. That is because there is very limited funding for replacing vehicles. Getting a new vehicle can easily take 3 to 4 years--and longer.

4.5.1.1. Occasionally you can get a temporary loan from the transportation squadron to replace a vehicle deadlined for maintenance or parts. Usually you must accommodate the need within your unit or rent a vehicle.

4.5.1.2. Civil engineers (and other support units) have one recurring problem with GP vehicles. These vehicles are subject to recall and redistribution to other base units with a "higher priority", especially during contingencies when you also need them most. There have not been too many effective ways to counter this. You need to let the commanders know the impact on your capabilities when this happens. Work with the transportation squadron and the logistics group commander to ensure your vehicles are listed with appropriate priorities for the various contingencies. Know which of your vehicles are subject to being pulled away to support others. Do not count on them being available. The commander's weekly update briefing is a good forum to highlight overall vehicle status and specific problems (if your unit conducts this briefing).

4.5.2. **Special Purpose Vehicles.** Experience shows this category of vehicles is the one most often critically short during contingency operations (figure 4.6). Depending on the installation mission, other base agencies may be authorized vehicles similar or identical to those in the CE fleet. If this is the case, a listing of such specialized equipment by type or capacity and by organization (including Army Air Force Exchange Service, Non-Appropriated Funds, etc.) should be maintained in the CE Contingency Response Plan.

Figure 4.6. Heavy Equipment.

4.5.2.1. Based on experience, the special purpose vehicles listed in table 4.3 are critical to support likely contingencies.

Table 4.3. Special Purpose Vehicles Important for Contingency Operations.
Crane (for erecting revetments) Front End Loader (including those mounted on farm tractors) Backhoe (including those mounted on farm tractors) Grader Low Boy with Tractor High Reach (bucket truck) Sweepers (Flightline and Street) Water Distributor Dump Trucks Bulldozer Line Truck Mobile Command Post RRR Vehicle Set Firefighting Crash Rescue Vehicles Base Recovery Vehicle (BRV) (M113 armored personnel carrier)* Munitions Clearance Vehicle (MCV) (M60A3) tank) HAZMAT Response Van/Trailer UA HHV (Up Armored Heavy Hummer Variant) will replace BRV when fielded.

4.5.2.2. You get special purpose vehicles the same way you get general purpose vehicles, but that does present one problem. Special purpose vehicles tend to be expensive, and they have to compete for the same pot of money as the general purpose vehicles. The temptation is very strong for the command to recommend buying ten pickups for daily use rather than one excavator. There are no good solutions. Do your homework when preparing your request. Make the justification strong, but realistic. Line up major command support in advance by letting the major command CE staff know what you need and why. They can and should fight for your needs. Occasionally your major command or the Air Staff will provide vehicles in a downward directed program. Many RRR and firefighting vehicles were purchased that way. To get a vehicle that is not listed in an Allowance Standard, you need a powerful justification and usually need to show cost savings.

4.5.3. Firefighting Vehicles. Firefighting vehicles (figure 4.7) are authorized to an installation based on aircraft assigned or supported and as specified in AS 012. Major command fire protection offices identify special requirements. The total number of people authorized in each fire department is based on the type and number of vehicles assigned. When contingency circumstances dictate the use of alternate water sources or refueling points, this data should be included in the CE Contingency Response Plan for quick reference.

Figure 4.7. Fire Truck.

4.5.4. **Explosive Ordnance Disposal Vehicles.** Both general and special purpose EOD vehicles are authorized based upon the mission and major command unique requirements and as allowed in ASs 012, 156, and 456. Special purpose vehicles include the armored vehicles listed in table 4.2. Those vehicles listed in AS 156 are predeployed at overseas locations, at CONUS bases supporting bombing and gunnery ranges, and the Silver Flag Exercise site only.

4.5.5. **Disaster Preparedness Vehicles.** The mobile command post is an alert vehicle assigned to the CE Readiness Flight. It provides the on-scene commander with command, control, and communications support for disaster response operations. It is typically equipped with communications equipment (radios, cellular telephone, fax machine, public address systems), sirens, maps/charts, and other disaster response equipment.

4.5.6. **Rental Vehicles.** You may be able to satisfy your shortfalls by renting vehicles and heavy equipment. The Desert Shield/Storm operations revealed this is true for bare bases as well as for main bases. However, this method of obtaining vehicles and equipment is highly dependent upon the beddown locations. Less developed nations cannot supply many types of special purpose vehicles.

4.5.6.1. Shortfalls may exist on a main base when vehicles are damaged, when they are out-of-commission for parts or maintenance, or when there are simply not enough of them. A list of civilian off-base sources for general and special purpose vehicles should be compiled by the base and maintained in the CE Contingency Response Plan. Where rental is contemplated, blanket purchase agreements (BPA) will prove satisfactory in most cases at a main base. For predictable conditions such as snow removal, requirements contracts can be considered. In either case, actual or sample purchase requests (AF Form 9) can be prepared in advance with as much data as possible filled in. File these forms in a convenient location and note this information in the CE

Contingency Response Plan. Samples forms can be included in the plan.

4.5.6.2. In the case of bare bases, WRM or other vehicles may not be there at all. This is especially true for rapid runway repair and other heavy equipment. Arranging for these items in advance may not be possible, but it becomes a high priority after a CE team arrives. The team leader needs to have his or her people find out where civilian equipment is available and simultaneously make contact with the contracting officer. This information should be covered in the Joint Support Plan for the beddown location.

4.5.7. **Borrowing Vehicles.** Depending on your location, you may be able to borrow vehicles from neighboring bases or other governmental agency. If so, be sure to include what type of vehicles and points of contact in the Contingency Response Plan.

4.5.8. **Spare Parts.** Because vehicles are so vital to CE performance, keeping them operating should have a high priority. Work with base transportation to ensure specialized vehicle repair parts and tires are available.

4.6. Summary. Let personnel, supply, contracting, and transportation work your requirements. But keep close track of what they are doing. If you cannot find what you need on base, you may find sources in the local community, at other air force bases, at other DoD military installations, with other governmental agencies, or with host nation military and civilian agencies. Always find out who to contact (name, phone number, address) and what procedures you must follow to get the desired assets. Document that information in the CE Contingency Response Plan.

4.6.1. Your major command can be a great source of help. They can get a lot of support moving to the base in a hurry. Make your requests through the installation commander, but give your major command civil engineer a heads up. By doing that, the major command CE staff can start working solutions to the problem even before a formal request for help arrives.

4.6.2. This chapter opened with a universal truth. It closes with a second. You need the help of other organizations to get your resources. Unfortunately, they will not always--and sometimes cannot--deliver the goods. It is tempting to blame them for your inability to support the mission when you do not get what you need. Avoid the urge! Keep your commander informed, and look hard for other ways to get the job done. Do not take no for an answer, but be prepared to pay for the support you need. And never give up.

Chapter 5

ORGANIZING TO RESPOND

"Organizing is what you do before you do something,
so that when you do it, it's not all mixed up."
A.A. Milne, Author, "*Winnie the Pooh*"

5.1. Introduction. Organizing your CE response teams is one of the smartest things you can do to prepare for a disaster. Doing so reduces initial postdisaster confusion and gets recovery activities started faster. You may never get all the people or equipment you need, but good organization helps make the people you do have more effective. There is no magic to organizing your teams. You must anticipate what tasks need to be done before, during, and after a crisis--and then make sure you have a team organized and trained to perform each task.

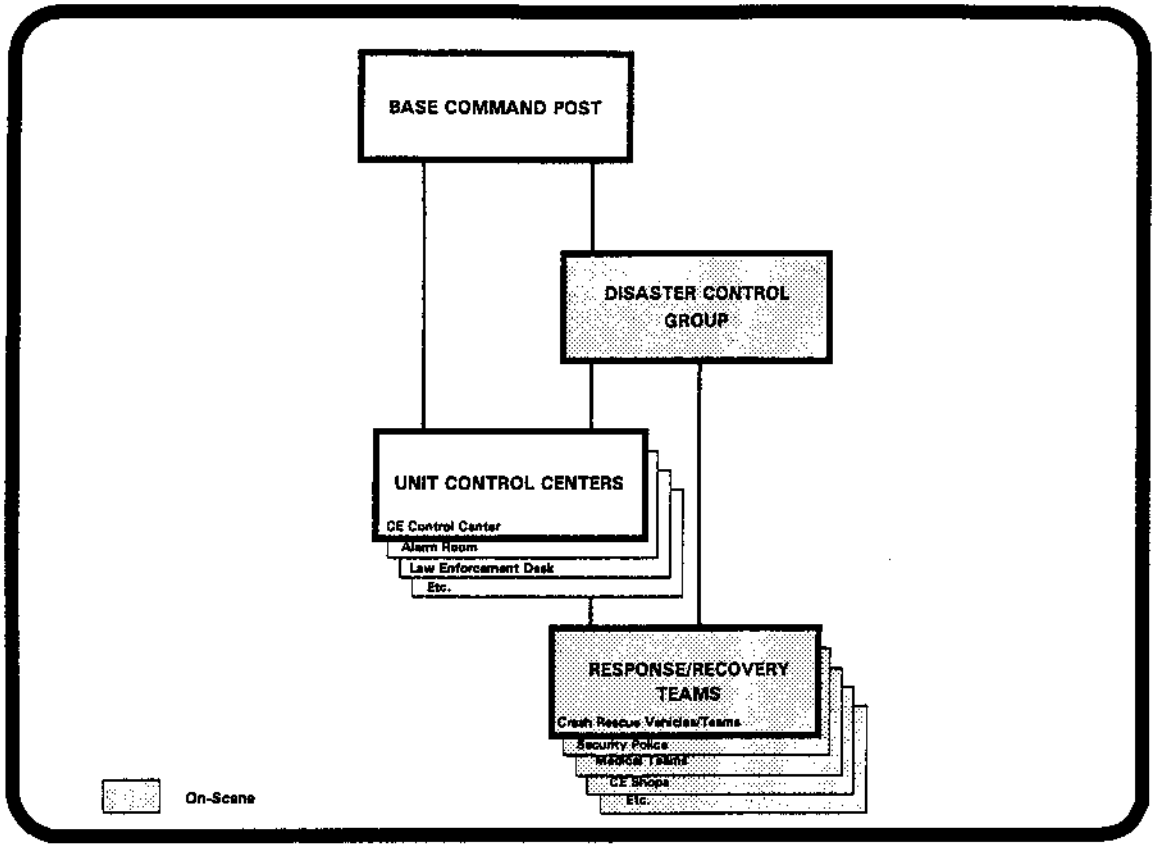
5.2. Overview. This chapter highlights how a typical Air Force base organizes to respond to disasters and how civil engineers fit into that organization. It shows a way civil engineer squadrons can organize for peacetime disaster response and for wartime response and base recovery. The chapter details the role and composition of special response teams which civil engineers may need, and offers tips for organizing those teams. It closes by discussing the organizational relationship you need with any CE force sent to augment your unit.

5.3. Base Organization for Disaster Response. Hopefully you have already been exposed to the base level disaster response organization. For those who have not, this short discussion may be useful. The base level organization for disaster response and base recovery can vary between bases, but the differences are not usually significant. Often only in name. No matter how the base is organized, similar functions and tasks must be performed. This permits some relatively universal observations about organizing for disaster and wartime responses.

5.3.1. **Peacetime Emergencies.** The base level disaster response structure is flexible. It adapts to the situation. Minor incidents are handled by normal base emergency response forces such as the fire department, security police, or base medical services. As response requirements become more complex, the emergency response organizational structure expands both horizontally and vertically. The peacetime organization focuses on saving lives and protecting property.

5.3.1.1. The Air Force uses the disaster response force (DRF) to respond to major accidents, natural disasters, and other peacetime contingencies beyond the scope of full time emergency response agencies. The DRF provides command and control for the incident and provides the personnel and equipment necessary to bring the situation under control. The DRF is composed of four elements: the on-scene disaster control group, the base command post, unit control centers, and functional response teams. In addition to the mobile command post, civil engineers provide representatives to the disaster control group to advise the on-scene commander and to direct CE teams at the site. Civil engineers support their on-scene representatives and CE teams through their control center. Figure 5.1 outlines the DRF structure. The premise behind this organizational approach is the base can best control its response to a disaster from an on-scene position where people can see and react to the problems. This works well when the disaster is confined to a limited area. The disaster control group directs on-scene emergency response and recovery teams. On-scene unit representatives request support from their respective control centers. Those control centers direct the activities of support teams not on-scene. The base command post provides direction and support to the disaster control group and tasks units as required. Additional details can be found in AFMAN 32-4004, *Emergency Response Operations*.

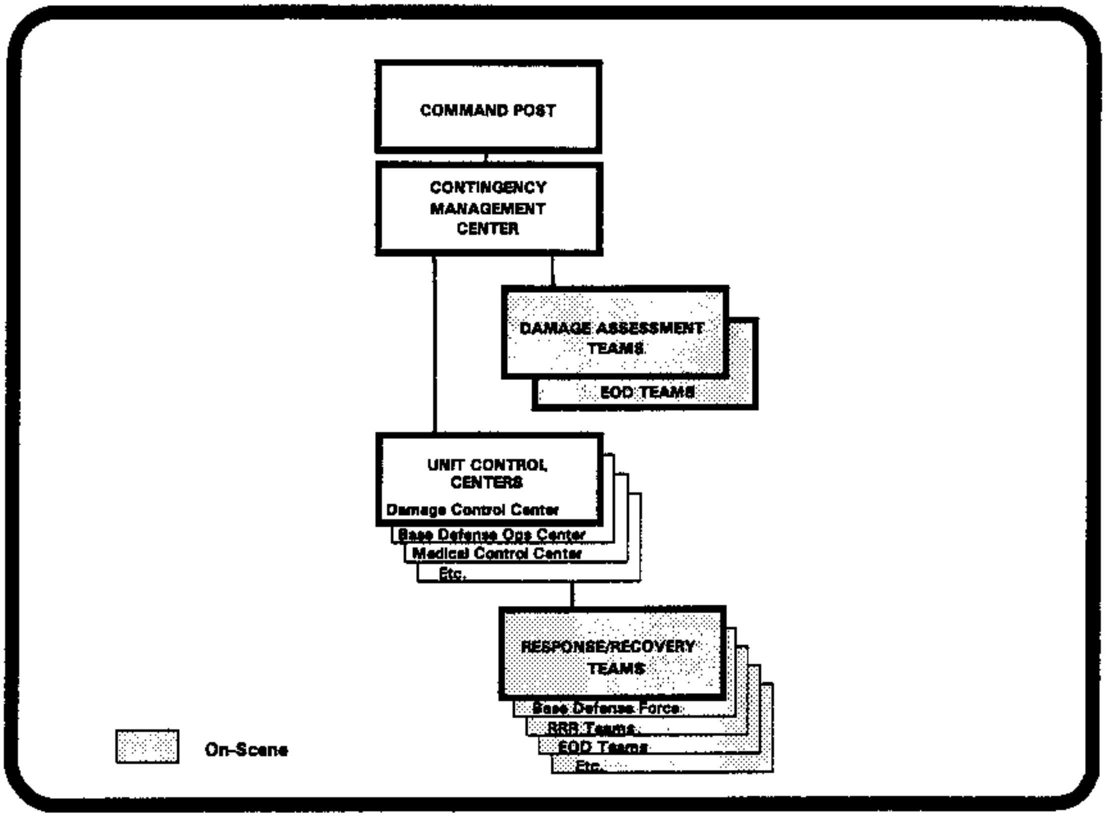
Figure 5.1. Disaster Response Force Organization.



5.3.1.2. In the most severe peacetime emergencies such as preparation for and recovery from hurricanes or massive flooding, an on-scene disaster control group can become inundated with information, lose the ability to see the big picture, and be unable to control the entire effort. In these situations, a control structure similar to that described for base recovery after attack can be more effective.

5.3.2. **Base Recovery After Attack.** At high threat locations, you can expect extensive damage, an intense level of recovery activity, and possible hazards such as UXO and chemical warfare agents following an enemy attack. That is not an environment for an on-scene control group. Instead, the Air Force relies on the Base Recovery After Attack (BRAAT) organizational structure shown in figure 5.2.

Figure 5.2. BRAAT Organization.



5.3.2.1. The command post, run by the wing commander, is responsible for controlling all activities so the wing can support higher headquarter's taskings. The activities include sortie generation, aircraft maintenance, base defense, base recovery, etc. Because the Operations Management Center (OMC) in the command post may be saturated with operational tasks/requirements, the contingency management center (CMC)--formerly called the survival recovery center (SRC) or contingency support staff (CSS)--is established as a command and control element to direct and monitor preattack survival actions and postattack recovery. It is also sometimes called the contingency support staff. The CMC (SRC or CSS), directed by the support group commander, receives mission requirements from the OMC. The CMC (SRC or CSS) then provides recovery guidance to lower level organizations usually through their control centers. Just as with peacetime responses, civil engineers play a major role in BRAAT. For example, the Base Civil Engineer (or a representative) reports to the CMC (SRC or CSS) to advise the support group commander and to guide the CE recovery effort. The CE control center controls most of the CE response teams.

5.3.2.2. This is not a wholesale organizational change from the peacetime disaster response structure. In fact, the two organizational structures are more alike than different. One difference is focus. The BRAAT organization is created to restore mission capability first and then to save lives and protect property.

5.4. CE Squadron. Now to the real thrust of this chapter--organizing the CE unit for disaster response and base recovery. Figure 5.3 outlines the peacetime organization for the objective CE squadron, and figure 5.4 shows a further breakout of the operations flight. Although the actual organization can vary between units, this basic structure is a good one for responding to most crises. Civil engineers must make some organizational adjustments for a crisis, and especially for war.

Figure 5.3. Objective CE Squadron.

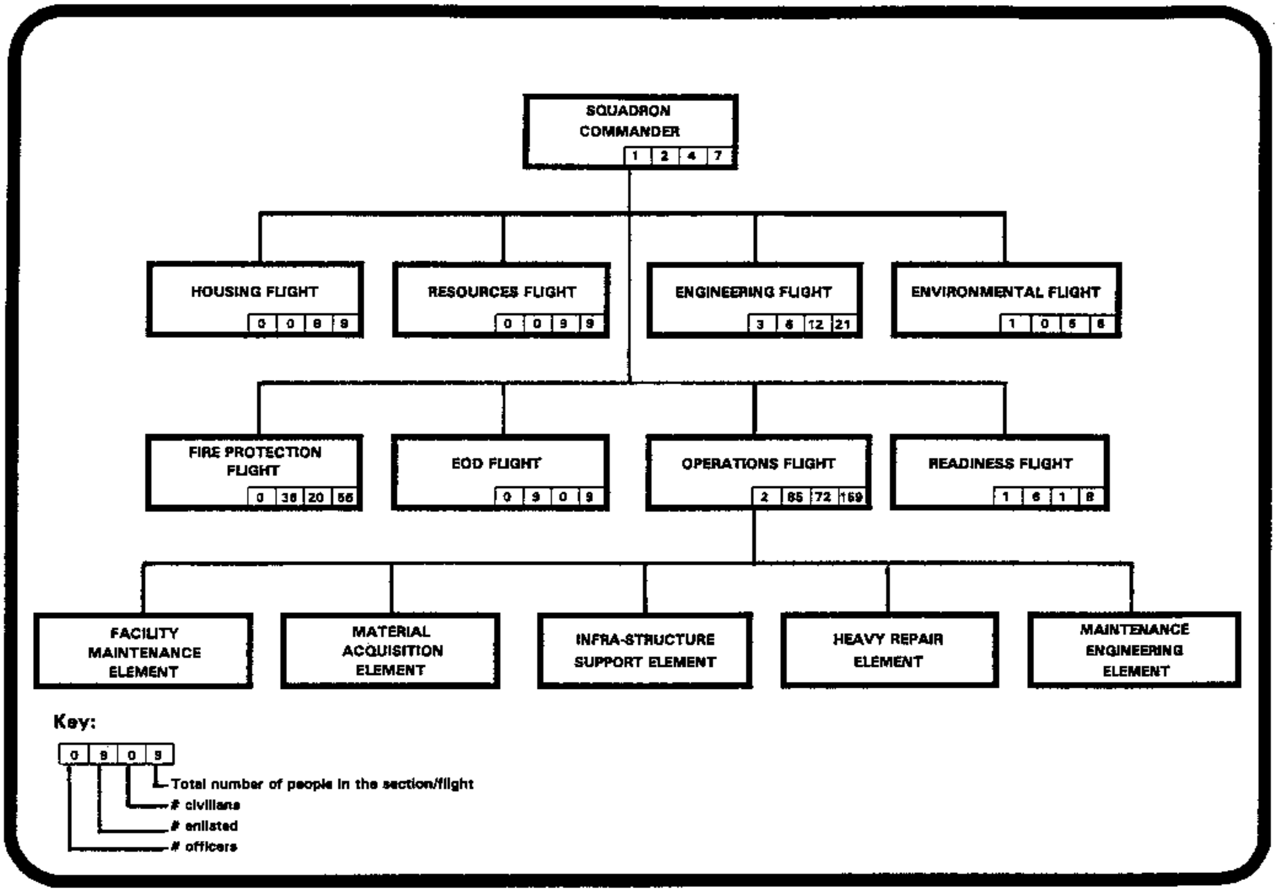
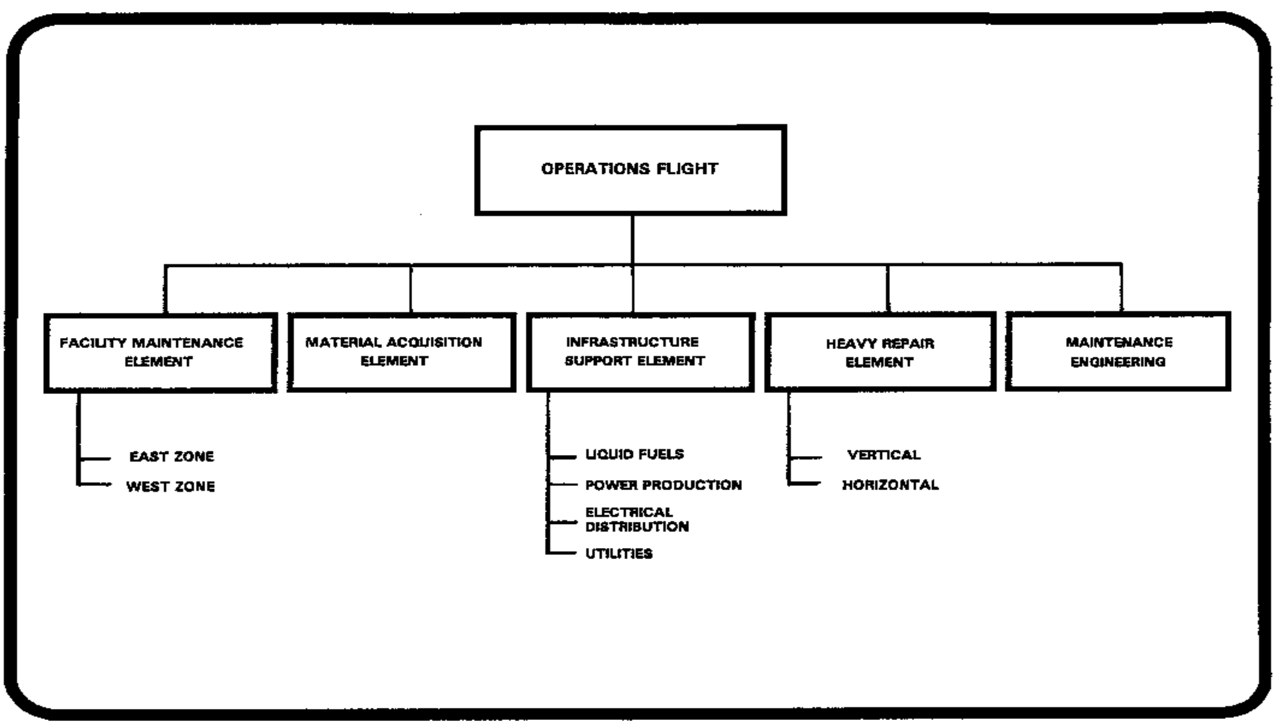


Figure 5.4. Operations Flight.

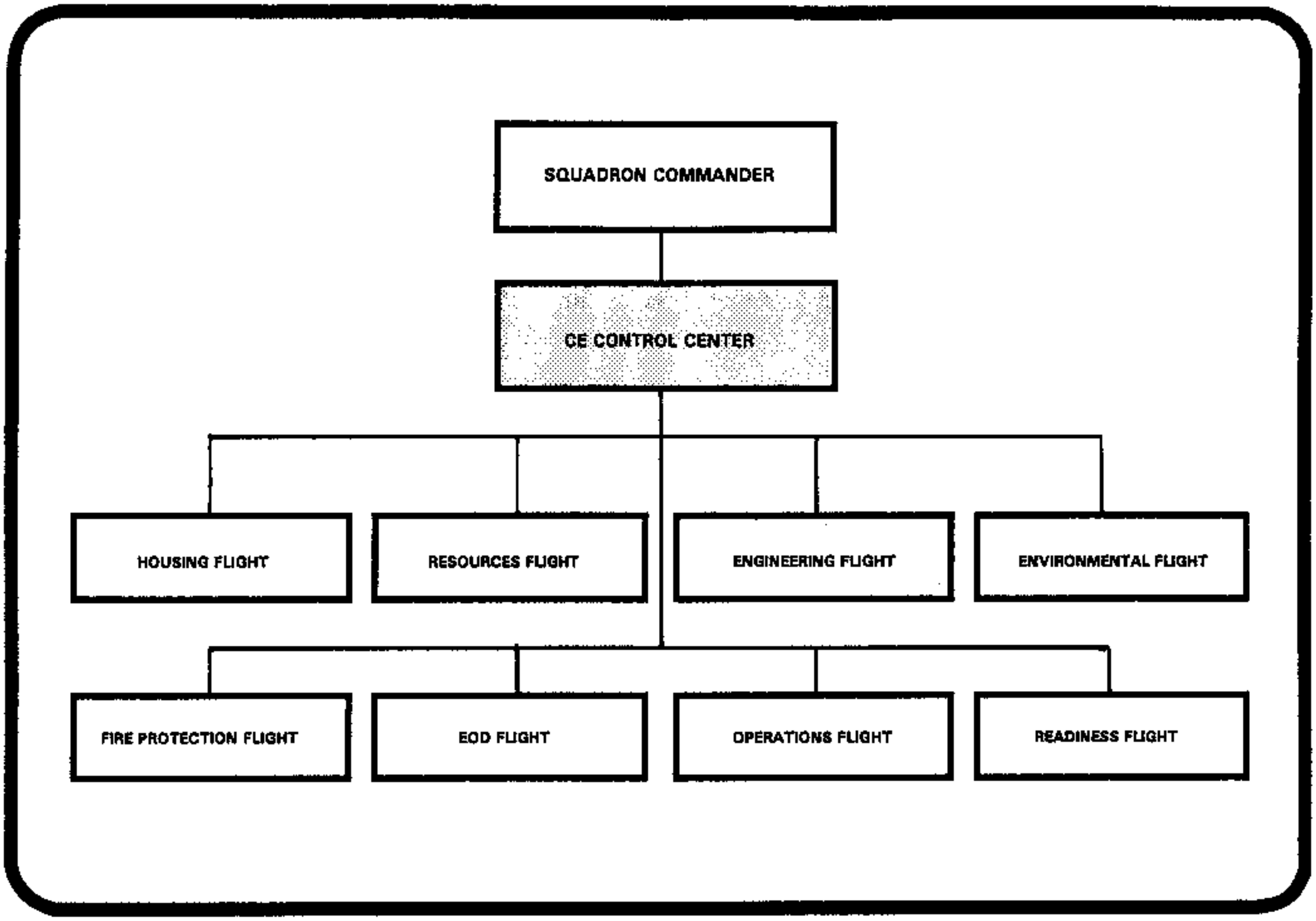


5.4.1. The base civil engineer generally controls CE responses from either on-scene or from the CMC (SRC or CSS), depending on the situation. As a rule of thumb, the BCE will be wherever the support group commander is. When in the CMC (SRC or CSS), the BCE has a small staff from the readiness flight to run the CMC (SRC or CSS) facility. In a BRAAT environment, additional people are added to perform NBC cell activities and to receive and plot facility damage and UXOs. The BCE provides direction to the CE control center (also called the Damage Control center or DCC) and to the few CE teams which are directly controlled from the CMC (SRC or CSS).

5.4.2. In any disaster, the readiness flight chief and flight personnel perform many key functions. They advise the support group commander and the BCE on response options. They act as facilitators and coordinators for the disaster response force. They respond on-scene with the mobile command post or open up the CMC (SRC or CSS), depending on the situation. In each case, they are the custodians of the command and control facilities and are responsible for doing the little and big things needed to keep the CMC (SRC or CSS) or the mobile command post operating. The base disaster preparedness support team augments the primary readiness flight people, as required.

5.4.3. Civil engineers do not use a central control activity in the objective squadron for daily operations. Except for the fire department alarm room, engineers must activate a control center to direct the efforts of CE forces (figure 5.5). The control center keeps the CE forces focused on what is most important and arranges support for them. Normally the Chief of Operations heads the control center and is supported by selected flight chiefs and element leaders plus damage plotters and radio operators.

Figure 5.5. CE Organization with Control Center Activated.



5.4.4. There are some conditions when the CE control center supports but does not direct the actions of selected CE teams. At major accidents and for "normal" emergencies, firefighters are controlled on-scene by the fire chief or an assistant chief and supported by the alarm room and the CE control center. During BRAAT operations, the fire chief will generally direct firefighting and crash rescue operations from the CE control center. Also during BRAAT operations, the damage assessment teams (DAT) and EOD teams are controlled directly from the CMC (SRC or CSS) due to time sensitive response requirements.

5.4.5. Another organizational adjustment is to form teams capable of responding to anticipated emergencies and performing likely recovery tasks. When possible, organizing response teams should be nothing more than assigning anticipated tasks to existing BCE shops or flights. Ideally every response team would consist of people from only one shop. Doing so eases command and control and logistics problems, especially if you keep the same crews and leaders together for all tasks. But individual shops are not always organized with the people, skills, or equipment to handle large scale or major multi-skill tasks. Consequently, BCEs must often combine the capabilities from two or more shops or flights to respond adequately. Form a multi-shop team by selecting a lead shop to perform a task, and augment that team from other shops when additional capabilities are needed.

5.4.6. Each crisis drives different requirements. However, the response and recovery tasks required during many crises are similar. Therefore, civil engineers can form relatively few teams to do common tasks. The process of building teams requires you to decide what situations you will plan for, decide what tasks need to be performed for each situation, and assign those tasks to existing shops or to multi-shop teams you create.

5.5. CE Response Teams. Many peacetime emergencies can be handled by the shops without forming multi-shop teams, but a major natural disaster, a major accident, or a base attack definitely requires special teams in addition to standard shop support. The following paragraphs outline three scenarios and suggest teams you should consider forming to respond to each crisis. They are just examples and not meant to be all inclusive. They are offered to help you prepare for other crises you may face as well. The structure and people of the objective squadron (figure 5.3.) are used for these examples. No distinction was made between military or civilian positions. In any shop, everyone must be able to do the assigned tasks. When appropriate, augmentees from the base READY program are used, especially the disaster preparedness support team. These scenarios do not apply to every base. Use what information you can and ignore the rest. Adjust the proposed teams to fit your base requirements and resources, and include the details in the Contingency Response Plan (see attachment 3).

5.6. Bomb Threat. Any installation can be the target of a bomb threat. For this crisis, the base response is usually directed by the on-scene control group. The security police and civil engineers play major roles. CE EOD forces must disarm explosive devices while other CE forces take actions to limit damage should a device explode. This threat can involve a number of CE shops, but probably not the entire unit. This is a scenario which CE can support well from the peacetime organization. While the control center may be activated, no special multi-shop teams need to be formed. The CE response is outlined in table 5.1. Additional details on each team follow in tables 5.2 to 5.7. Other CE shops may also be players in a bomb threat. For example, the heavy repair element can haul soil and build blast berms or place heavy equipment to form blast barriers or traffic barricades. When other shops are called on, they can expect to perform tasks which they commonly do or which require no extra training. Such tasks are identified on-scene and cannot be anticipated. Upon notification of a crisis, smart shop leaders decide which work crews or individuals they would dispatch if called upon and give those people a heads-up. This last bit of common sense applies to every crisis.

5.7. Major Natural Disaster. No matter its location, every base is vulnerable to some form of natural disaster. In this scenario, reestablishing the flying mission is not an immediate priority. Support from off-base or from other military units is available, but not necessarily in the local area. You can also assume facilities and utility systems are damaged across the entire base. Such a disaster requires a base wide response, and that response is controlled from the CMC (SRC or CSS) through unit control centers. This example is included to show how an entire CE unit might respond to a situation which can be supported from the existing shops. A few multi-shop teams may be needed. A logical assignment of functions to shops or teams is outlined in table 5.8. Of course an actual situation can easily dictate adjustments to this list. Additional information on each shop or team follows in tables 5.9 to 5.22.

5.8. Base Recovery After Attack (BRAAT)--Initial Response. This scenario applies to overseas bases which are subject to a major enemy air attack. In this example, assume airfield pavements, facilities, and utility systems are extensively damaged. The damage prevents the aircraft from flying and hinders aircraft generation activities. In the first few hours after the attack, the overriding base priority is to get the aircraft flying again. The base-wide response is controlled from the CMC (SRC or CSS) through unit control centers. Support from off-base or from other military units is not available. This requires the use of an R-3 rapid runway repair equipment set. Special teams must be formed within the CE organization to give priority to recovery actions which quickly restore the flying mission. A listing of needed teams is outlined in table 5.23 with additional information on each team following in tables 5.24 through 5.44. Because this effort is equipment intensive and there are not enough heavy equipment operators to cover all pieces of equipment, many specialties must learn to operate equipment they do not normally use. Except for firefighting, this organizational arrangement covers a 12-hour shift.

5.9. Some Thoughts On Organizing Teams. A few thoughts may help put the process of organizing your response teams into perspective.

5.9.1. You can organize too much. It is so easy and tempting to organize every response, but the results become complicated--and confusing. Fight the urge. Keep things simple. If it does not make sense to someone, it probably is not the best you can do.

5.9.2. You can have the best organization on paper, but it is worthless unless you tell the team members what team they are on, where to report when called, what tools and equipment they are to bring, and who is in charge.

5.9.3. Give a little extra attention to tasks which need quick team response, those which are not normally done in the peacetime base O&M environment (things people are not used to doing), and those which need extra training as a team to be effective.

5.9.4. Be aware of dual taskings to shops. It is only a problem if two jobs need to be done at the same time.

5.9.5. If someone can do a task, do not worry whether he or she has the right AFS or is in the right shop.

5.9.6. A changing organizational structure is not a problem. Over the years, the CE organization has changed a number of times in response to world changes and new ways of doing business. Engineers still have the same tasks to perform and the same skills available. It still remains a matter of assigning the tasks to the most logical shop and augmenting from other shops as needed.

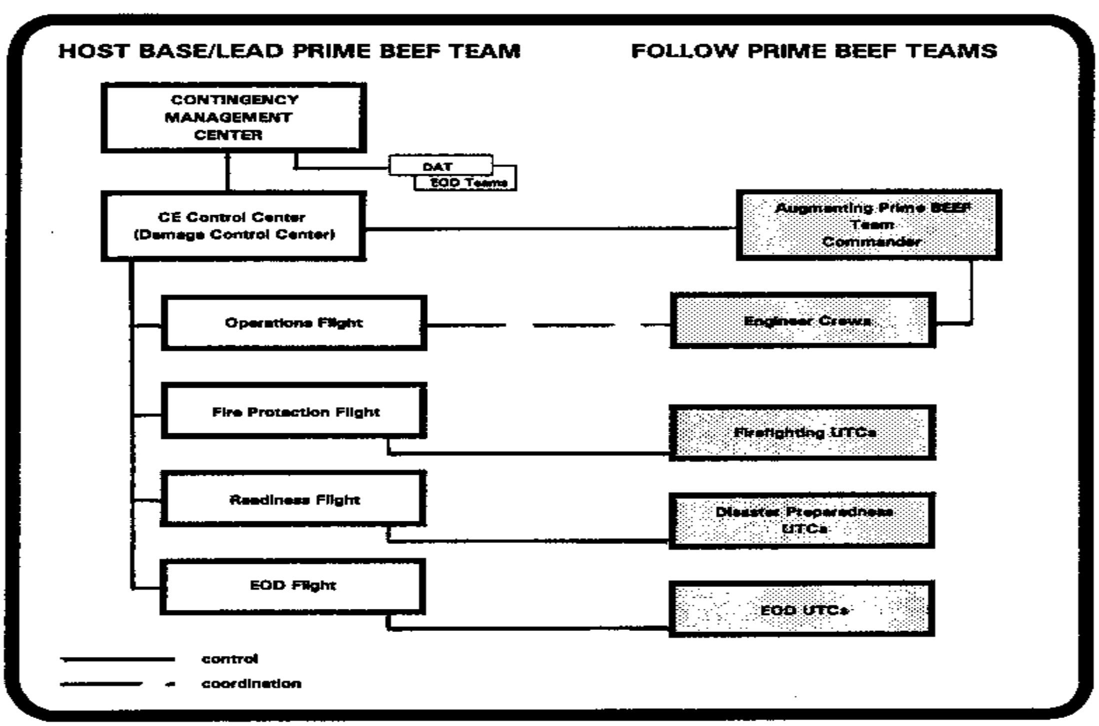
5.9.7. There are no hard rules on organizing teams. Therefore, there are no right or wrong solutions. If it works for you, it is good.

5.10. Augmenting Forces. Operations plans call for CONUS Prime BEEF forces to deploy overseas in support of deployed flying squadrons. Upon arrival, a deploying

Prime BEEF unit will augment the in-place CE organization if there is one. If the team is a follow Prime BEEF team, it will augment the lead team. Ideally, preparations for this augmentation begin well before the team arrives in the case of an in-place force. Vehicles and equipment need to be provided. Command and control relationships need to be worked out. To minimize the problems of integration, the augmenting Prime BEEF force is placed under the operational control of the host BCE or lead team commander.

5.10.1. This pamphlet and other documents consistently stress the value of team integrity and of having people work for the same leaders, even in changing situations. If that concept is good for your unit, it also applies to a Prime BEEF team which might augment you. They should maintain their unit integrity. Task them through their representatives in your control center in much the same way you assign tasks to your CE forces. The augmenting unit commander then ensures those tasks are completed. This concept is outlined in figure 5.6. This approach, rather than total integration, is taken because the Prime BEEF team and host unit are organized and trained separately. As a result, individuals know their leaders, have learned their coworkers strengths and weaknesses, and have learned to work as a team. This cohesion results in more efficient and better controlled repair efforts.

Figure 5.6. Integration of Host/Augmenting Forces.



5.10.2. There should be sufficient commonality of training that both units can work side-by-side to recover the base. On some tasks, the combined skills of both units will be required. In those circumstances, a work crew/team from one unit should be detailed (loaned) to the other unit for a specific task. When that task is complete, the loaned crew should return to the control of its parent unit, unless the crew is immediately reassigned to another joint task.

5.10.3. Some recovery tasks require detailed knowledge of the host base. Often such tasks involve the utility systems. When assigning those tasks to the augmenting unit, the host BCE should detail at least one in-place expert to help each augmenting work crew.

5.10.4. There are logical exceptions to this "rule". People deploying as part of small UTCs will integrate with the lead Prime BEEF team or the host USAF civil engineer organization. People from the same UTC can still be assigned to the same work crew to maintain some form of integrity. All firefighters will integrate with the USAF host or lead unit firefighters.

5.10.5. Not every Prime BEEF team goes to a MOB. COBs offer even greater possibilities for variation since USAF units must integrate their efforts with host nation forces. As a deploying unit, it is your job to figure out how things are organized and adjust to the differences. Be sure to tell your people what the adjustments are.

5.11. Summary. Civil Engineers are major players in most crisis responses. Consequently, to provide adequate support to the base and its mission, you need to anticipate what crises you may face, what tasks you must do, and assign those tasks to existing shops or special teams. A good organization is just a starting point to help make your initial response to a crisis as effective as possible.

Table 5.1. CE Response--Bomb Threat.

FUNCTION	TEAM/CREW	NUMBER OF TEAMS/ CREWS
Command and Control	Mobile Command Post	1
	OSCG (CE Representatives)	1
	CE Control Center	1
Vulnerability Reduction--Utilities Isolation	Electrical Distribution Crew	1 - 2
	Utilities Crew	1
Hazard Clearance	EOD Team	1 - 2
Firefighting/Crash Rescue	Firefighter Crew	1 - 2
Other Support	Heavy Equipment Crew	As required

Table 5.2. Mobile Command Post.

Team Size: 2

Description of Activities: The mobile command post is driven to the site of a disaster to provide communications capabilities for the on-scene commander. Readiness flight chief/ personnel advise and assist the on-scene commander on emergency response procedures. This team also maintains the on-scene incident events log and an emergency communications capability through the mobile command post.
Source of Team Members: Readiness flight.
Other Comments: One person should staff the mobile command post and the other stays close by the on-scene commander to advise. If the situation is not too hectic, the senior person can also direct the activities of the responding CE teams other than EOD and firefighters.

Table 5.3. On-Scene Control Group (CE Representatives).
Team Size: 2-3
Description of Activities: Advises the on-scene commander and directs the actions of CE teams supporting the crisis.
Source of Team Members: The CE representative is usually an officer, but can be a senior NCO or a civilian. Often the BCE will assume this position. Also part of this team is the fire chief or assistant chief and a senior EOD specialist.

Table 5.4. CE Control Center.
Team Size: 4-5
Description of Activities: Directs the behind the scenes support for the on-scene representative.
Source of Team Members: For a bomb threat, the staffing can be cut to four or five people (e.g., control center chief, infrastructure support representative, heavy repair representative, radio operator, and plotter).
Other Comments: Some bases may not choose to activate the CE control center. Instead, they rely on the on-scene representative to contact line supervisors directly to arrange for shop support.

Table 5.5. Electrical Distribution/Utilities Crews.
Team Size: 3-4 for electrical distribution; 1 for power production; 1-2 for utilities.
Description of Activities: An electrical distribution crew is needed should it be desirable to isolate or cut electrical power to a threatened facility or area. If the facility is served by a stand-by generator, a power production person may also be needed to keep the generator from supplying power. A utilities crew would isolate any natural gas or water lines.
Source of Team Members: Infrastructure Support Element. Each shop forms the needed teams from whomever is available at the moment.

Table 5.6. EOD Team.

Team Size: 2-3
Description of Activities: Teams disarm or render safe any unexploded devices.
Source of Team Members: EOD flight
Other Comments: The EOD team is the backbone of the CE response to bomb threats and unexploded ordnance situation. One two-person team per suspected improvised explosive device should be adequate, but another team can be very helpful in arranging support and transport of unexploded devices.

Table 5.7. Firefighting Crew.
Team Size: 3-4. Crew size is a function of the fire rescue and suppression vehicle which responds. The fire chief or an assistant chief will also respond to command and control the Firefighter response.
Description of Activities: Provides fire suppression, rescue, hazardous material mitigation, and emergency first-aid capability should the "bomb" explode.
Source of Team Members: Fire protection flight
Other Comments: Depending on the situation, additional fire crews may be needed--as a minimum, one at the site of each explosive device.

Table 5.8. CE Response--Major Natural Disaster.

FUNCTION	SHOPS/TEAMS	NUMBER OF TEAMS/CREWS
Command and Control	Mobile Command Post CMC (CE Team) CE Control Center	As required 1 1
Vulnerability Reduction--Utilities Isolation	Infrastructure Support Crews	As required
Damage and Hazard Assessment	DARTs Infrastructure Support Crews	3 As required
Hazard Clearance	DARTs Infrastructure Support Crews Heavy Repair Crews EOD Teams	As required
Firefighting/Crash Rescue	Fire Protection Crews	As required
Search and Rescue	Fire Protection Crews Facility Maintenance Crews EOD Teams Heavy Repair Crews Engineering Crews	As required
Emergency Utilities	Infrastructure Support Crews	As required
Beddown/Emergency Shelters	Facility Maintenance Crews EOD Teams Engineering Teams Housing Flight Members	As required
Emergency Sanitation	Heavy Repair Crews Infrastructure Support Crews	As required
Facility Repair	Facility Maintenance Crews Heavy Repair Crews Engineering Crews	As required

Table 5.8. CE Response--Major Natural Disaster.

Utility System Repair	Infrastructure Support Crews Heavy Repair Crews Engineering Crews	As required
Contamination Monitoring, Control, and Containment	Fire Protection Crews Spill Response Team Environmental Flight Members Readiness Flight Members	As required
Logistics Support	Material Acquisition Element	As required
Security	Security Teams	As required
NOTE: The number of teams/crews will vary with the situation.		

Table 5.9. Contingency Management Center Staff (CE Team).

Team Size: 3-4
Description of Activities: Provides information and advice to the wing or support group commander on CE base recovery activities and on support to civil authorities. The team members record and plot damage; keep track of recovery status; answer phones and operate CE radios, and keep counterparts in DCC informed. Ensures responding organizations maintain expenditure records for manhours, equipment, and supplies used to support civil authority recovery operations and provide copies to the CMC and the CE control center. Coordinates/recommends execution of evacuation plans or coordinates shelter activation and stocking to support people that must leave their primary residence due to the disaster.
Team Composition: The BCE or a representative heads this team. Generally, the other members of this team will include the readiness flight chief, technicians from the readiness flight, an EOD technician from the EOD flight, and an engineering technician from the engineering flight. However, any specialty can serve if smart, trained, and cool under pressure. At least one person from the readiness flight "operates" the CMC, but that person requires augmentation from the disaster preparedness support team.

Table 5.10. CE Control Center.

Team Size: 7-9
Description of Activities: Directs all CE response activities.
Team Composition: Operations flight chief (control center chief), 1 - infrastructure support representative, 1 - heavy repair representative, 1 - facility maintenance representative, 1 - readiness flight representative, 1 - EOD flight representative, as required; 1 - 2 radio operators, and 1 - 2 plotters.

Table 5.11. Damage Assessment and Response Team (DARTs).
Team Size: 4
Description of Activities: This multi-specialty team surveys damaged utilities and facilities, identifies other hazards, conducts emergency utility isolation, evaluates repair and demolition requirements, estimates manpower and equipment requirements, and coordinates on-scene recovery operations if directed by the CE control center.
Team Composition: **Number of People and Specialty** — **Source** 1 engineer (3EXX), team chief — Engineering flight 1 electrical systems (3E0X1) — Facility maintenance element 1 utilities systems (3E4X1) — Facility maintenance element 1 heating, ventilation, air conditioning, and refrigeration (3E1X1) — Facility maintenance element
Other Comments: The facility maintenance element is a prime source for the specialists. If the element is divided into zones, each zonal shop can provide the people to make up a DART. When practical, they should assess damage in their own zones. You will likely need two or more teams. Each team is assigned an area of the base to assess. To gain a faster picture of the amount of damage, you can form additional DARTs and reduce the area each must survey. The individuals on these supplemental teams should be returned to their shops as soon as the initial survey is complete, so they can help in the recovery work. You may need to use people from the infrastructure support element to augment the teams.

Table 5.12. Infrastructure Support Crews.
Team Size: Varies with task.
Description of Activities: Work crews are formed as needed from each shop to isolate utility systems to minimize damage, assess damage to the base utility systems, clear hazards such as downed electrical power lines, provide emergency utilities such as generator power and water points, repair damaged utility systems, and provide utilities (power, water, and sewage) to emergency shelters.
Source of Team Members: Each shop in the infrastructure support element

Table 5.13. Heavy Repair Crews.
Team Size: Varies with task. With heavy equipment, often 1-2 people working alone or temporarily assigned to support a crew from another shop.
Description of Activities: These crews are called on to clear hazards such as debris on airfield surfaces or in streets, especially those streets which serve as primary access routes for ambulances and fire trucks; provide heavy equipment support for search and rescue operations, emergency shelter erection, temporary installation of utilities, facility repairs, and utility systems repairs; repair damaged pavements; provide emergency sanitation services such as pest control and waste disposal; support search and rescue efforts by shoring facilities, and repair moderately damaged facilities.
Source of Team Members: Each shop in the heavy repair element.

Table 5.14. Facility Maintenance Crews.
Team Size: Varies with task.
Description of Activities: These crews play a lead role in three postdisaster activities: search and rescue; emergency shelter erection, and facility repairs. In search and rescue, they could be tasked to isolate utilities to damaged facilities or shore up those facilities to permit access to trapped victims. These crews are well qualified to erect emergency shelters for victims of a natural disaster. They can be involved in repairs to make lightly damaged facilities usable.
Source of Team Members: Each shop in the facility maintenance element.
Other Comments: Because of the many skills represented, these shops are very versatile in being able to respond to crisis taskings, but they are equipment constrained to "light" construction and repairs.

Table 5.15. EOD Teams.
Team Size: 2-3
Description of Activities: EOD teams do not normally have a major role in responding to natural disasters, but they are the first choice to explosively clear hazards or obstacles to recovery efforts. They can also supplement the facilities maintenance element in search and rescue and emergency shelter erection activities. This proposal is purely arbitrary. They can be used in any task requiring manpower, but do not let such tasks interfere with their primary duties.
Source of Team Members: EOD flight

Table 5.16. Fire Protection Crews.
Team Size: Varies with manning of each crash-rescue or structural firefighting vehicle and the situation.
Description of Activities: Besides fighting fires, these crews play a leading role in search and rescue attempts and can also provide emergency medical treatment. It is possible in a natural disaster to have hazardous material spill problems. Depending on the severity of the spill, these crews may have to respond to reduce an immediate hazard.
Source of Team Members: Fire protection flight
Other Comments: This is the only CE activity specifically manned to operate 24 hours per day.

Table 5.17. Engineering Teams.
Team Size: Varies with task.
Description of Activities: Engineering teams could be called on to provide structural assessments of damaged facilities to assess the hazard to rescuers during search and rescue operations. These teams may also provide siting for emergency shelters as well as provide design support for facility and utility system repairs. They may also be needed to prepare emergency contracts and cost estimates for contract services.
Source of Team Members: Engineering flight

Table 5.18. Housing Flight.
Team Size: Not applicable.
Description of Activities: In normal circumstances, the housing flight would not be involved in disaster response activities. However should there be a need to shelter a number of victims, the housing flight could be called upon to identify housing units which victims can occupy. (A good example of this was the mandatory sharing of quarters on Subic Naval Base with the evacuees from Clark Air Base preceding and following the eruption of Mt Pinatubo in the Philippines.)
Source of Team Members: Housing flight

Table 5.19. Spill Response Team.
Team Size: Varies by base.
Description of Activities: Initial response is by the fire department with follow-up by the spill response team. The environmental flight gets involved in a natural disaster when it becomes necessary to dispose of wastes or to contain a hazardous material spill. This shop will help determine the best way to handle immediate disposal problems with, hopefully, the least long term impact.
Source of Team Members: Environmental flight

Table 5.20. Maintenance Engineering Element.
Team Size: Not applicable.
Description of Activities: Initially, you may not think this shop has a disaster response role. In fact, this shop should be very busy directing repair work to SABER (Simplified Acquisition Base Engineer Requirements) or other existing contractors to supplement the in-house CE effort following a natural disaster.
Source of Team Members: Maintenance engineering element.

Table 5.21. Material Acquisition Element.
Team Size: Not applicable.
Description of Activities: This element will work long hours with base supply and contracting to get needed recovery materials.
Source of Team Members: Material acquisition element.

Table 5.22. Security Teams.
Team Size: 1-3
Description of Activities: Guards CE vehicles, equipment, and supplies from theft.
Source of Team Members: Generally from each shop.
Other Comments: When a natural disaster affects an entire area, the scarcity of materials prompts some people to steal what they cannot get in the stores. The security police cannot guard all important recovery assets. The users must contribute to this effort. CE must be prepared to protect its own resources. When assets can be centrally located and placed in a fenced area, fewer CE security teams are needed.

Table 5.23. Initial CE Response--BRAAT.

FUNCTION	**TEAM/CREW**	**NUMBER OF TEAMS/CREWS**
Command and Control	CMC (CE Team) Alternate CMC (CE Team) CE Control Center Alternate CE Control Center	1 1 1 1
Damage and Hazard Assessment	DATs DARTs	3 3
Hazard Clearance	EOD Teams Bomb Removal Crews	3 As required
Emergency Utilities	Generator Response Crews EALS Installation Team	2 1
Contamination Monitoring, Control, and Containment	NBC Reconnaissance Teams Contamination Control Teams Shelter Management Teams	3 As required As required
Rapid Runway Repair	RRR C^2 Team Crater Repair Crews Hauling Team FOD Removal Team MOS Marking Team Spall Repair Teams MAAS Installation Team	1 6 1 1 1 4 1
Firefighting/Crash Rescue	Firefighting Crews	Varies

Table 5.24. Contingency Management Center (CE Team).	
Team Size: 3-6	
Description of Activities: Provides information and advice to the wing or support group commander on passive defense actions, NBC and UXO hazards and protective actions and on CE base recovery activities. The team members record and plot damage and hazards; keep track of recovery status; answer phones and operate CE radios, and keep counterparts in the DCC informed. When performing NBC cell functions, directs the NBC surveillance teams and provides technical guidance to unit shelter management teams.	
Team Composition:	
Number of People and Specialty	**Source**
1 BCE or representative (3EXX)	
1 readiness flight chief	Readiness flight
2 readiness (3E9X1)	Readiness flight
1 engineering (3E5X1)	Engineering flight
1 explosive ordnance disposal (3E8X1)	EOD flight
Other Comments: These recommended specialties are not absolute. Any specialty can support the BCE if the person is smart, trained, and cool under pressure. The disaster preparedness support team members should be available to augment the readiness flight personnel.	

Table 5.25. Alternate CMC (CE Team).	
Team Size: 2	
Description of Activities: Keeps duplicate CE related information which is recorded and plotted at the primary CMC so the alternate CMC, when augmented, can assume the primary function with little or no notice.	
Team Composition:	
Number of People and Specialty	**Source**
1 engineer (3EXX), or	Engineering flight
1 engineering (3E5X1)	Engineering flight
1 readiness (3E9X1)	Readiness flight
2 augmentee	Base READY program
Other Comments: Depending upon the perceived threat and availability of forces, this team may only consist of 2-3 personnel to maintain continuity. If the primary center is destroyed or rendered unusable, these personnel would then be augmented with available personnel. Some bases may choose not to staff an alternate CMC until it is needed.	

Table 5.26. CE Control Center (Damage Control Center).	
Team Size: 7-11	
Description of Activities: Directs all CE response activities; coordinates those activities with other base organizations; arranges support from others as needed.	
Team Composition:	
Number of People and Specialty	**Source**
1 control center chief (3EXX)	Chief, operations flight
1 infrastructure representative	Infrastructure support element
1 heavy repair representative	Heavy repair element
1 facility maintenance representative	Facility maintenance element
1 firefighter radio operator (3E7X1)	Fire protection flight
2 radio operators (any AFS)	Any shop
2 damage plotters (3E5X1)	Maintenance engineering element
Other Comments: In this example, control and communications for fire operations is included in the CE control center. Some bases may choose to include a second infrastructure support representative so both water and electrical distribution are represented.	

Table 5.27. Alternate CE Control Center.	
Team Size: 4	
Description of Activities: Tracks and records information plotted at the primary CE control center, so it can assume the primary control center role if required. Provides backup control and communications for fire operations.	
Team Composition:	
Number of People and Specialty	**Source**
1 engineer (3EXX), team chief	Engineering flight
1 readiness (3E9X1)	Readiness flight
2 fire protection (3E7X1)	Fire protection flight
Other Comments: Some bases choose not to staff an alternate CE control center until it is needed.	

Table 5.28. Damage Assessment Teams (DATs).	
Team Size: 3-4	
Description of Activities: Surveys airfield surfaces and facilities for damage; classifies, records, and marks UXO locations; and determines and marks routes of travel for airfield repair teams.	
Team Composition:	
Number of People and Specialty	**Source**
1 engineer assistant (3E5X1)	Engineering flight
1 EOD (3E8X1)	EOD flight
1 augmentee (any AFS)	Any shop
Other Comments: EOD and engineering specialists plus an augmentee make up the DAT. While the augmentee can come from any shop, the person should train in damage assessment with the other team members.	

Table 5.29. Damage Assessment and Response Teams (DARTs).	
Team Size: 4	
Description of Activities: This multi-specialty team surveys damaged utilities and facilities, identifies other hazards, conducts emergency utility isolation, evaluates repair and demolition requirements, estimates manpower and equipment requirements, and coordinates on-scene recovery operations if directed by the CE control center.	
Team Composition:	
Number of People and Specialty	**Source**
1 engineer (3EXX), team chief	Engineering flight
1 electrical systems (3E0X1)	Facility maintenance element
1 utilities systems (3E4X1)	Facility maintenance element
1 heating, ventilation, air conditioning, and refrigeration (3E1X1)	Facility maintenance element
Other Comments: This is the same structure as outlined for a natural disaster response.	

Table 5.30. EOD Teams.

Team Size: 2

Description of Activities: Safes UXO.

Team Composition:

Number of People and Specialty	Source
2 EOD (3E8X1)	EOD flight
2 augmentees (any AFS)	Any shop

Other Comments: This specialty is in short supply to support a base recovery effort of the magnitude in this example. Two augmentees are normally assigned to assist this team. Getting augmentees from within CE is ideal. That makes getting and training them easier. A base could expect up to 22 EOD technicians to support EOD activities in a BRAAT environment. That number includes the EOD representatives in the CMC. Four to five 2-person teams per shift are recommended, not counting augmentees.

Table 5.31. Bomb Removal Crews.

Team Size: 3

Description of Activities: When time permits, this crew follows the EOD teams to move "safed" munitions to locations where unexpected detonations would have no impact on the mission.

Team Composition:

Number of People and Specialty	Source
1 EOD (3E8X1), team chief	EOD flight
2 augmentees (any AFS)	Any shop

Other Comments: These crews can be formed when needed. An EOD technician will lead a crew. Anyone can support this effort, but whoever is assigned should be able to operate a dump truck, general purpose vehicles, and a front-end loader or forklift. The need for and number of these teams will vary with the intensity of attack.

Table 5.32. Generator Response Crews.

Team Size: 4

Description of Activities: Expediently restores power or reestablishes backup power to critical base facilities. Establishes generator power and lights for RRR and other war damage repair crews.

Team Composition:

Number of People and Specialty	Source
2 electric power production (3E0X2)	Infrastructure support element
1 liquid fuel systems maintenance (3E4X2)	Infrastructure support element
1 electrical system (3E0X1)	Infrastructure support element

Table 5.33. EALS Installation Team.	
Team Size: 4	
Description of Activities: Installs the emergency airfield lighting system on the MOS.	
Team Composition:	
Number of People and Specialty	**Source**
4 electrical systems (3E0X1)	Infrastructure support element

Table 5.34. NBC Reconnaissance Teams.	
Team Size: 2	
Description of Activities: Teams detect hazards and determine extent of contamination on-base.	
Team Composition:	
Number of People and Specialty	**Source**
2 readiness (3E9X1), or 2 augmentees (any AFS)	Readiness flight Disaster preparedness support team

Table 5.35. Contamination Control Teams.	
Team Size: 2	
Description of Activities: Decontaminates unit vehicles and equipment. May also assist NBC monitoring teams determine the presence and extent of NBC agents.	
Team Composition:	
Number of People and Specialty	**Source**
2 CE augmentees (any AFS)	Any CE shop
Other Comments: Two-person.	

Table 5.36. RRR Command and Control Team.	
Team Size: 3-5	
Description of Activities: Provides on-scene control and guidance for the RRR efforts to minimize the total repair time so aircraft can begin flying as soon as possible.	
Team Composition:	
<u>Number of People and Specialty</u>	**<u>Source</u>**
1 engineer (3EXX), RRR OIC	Maintenance engineering element
1 civil engineer manager (3E000), RRR NCOIC	Heavy repair element
1 engineer (3EXX), support team chief	Maintenance engineering element
Other Comments: You may not have sufficient officers to fill all positions. You have some options: borrow officers from the DARTs or use senior NCOs. You may also choose to insert a MOS repair chief to guide the efforts of three repair crews on the MOS and a Taxiway repair chief to do the same on the remaining three crews working on the taxiways and MOS access routes.	

Table 5.37. Crater Repair Crews.	
Team Size: 11	
Description of Activities: Repairs craters on the airfield pavements.	
Team Composition:	
MOS Repair	
<u>Number of People and Specialty</u>	**<u>Source</u>**
1 pavements & construction equipment (3E2X1), crew chief	Heavy repair element
7 heavy repair technicians (pavements & construction equipment, structural, and pest management specialties	Heavy repair element
1 engineering (3E5X1)	Engineering flight
2 infrastructure support technicians (any specialty)	Infrastructure support element
Taxiway Repair Crew	
<u>Number of People and Specialty</u>	**<u>Source</u>**
3 pavements & construction equipment (3E2X1), including one crew chief	Heavy repair element
7 facility maintenance technicians (any AFS)	Facility maintenance element
1 engineering (3E5X1)	Engineering flight
Other Comments: Because they have the skills and training, the crew chiefs come from the heavy repair element. In this example, the MOS repair team (three crews) is composed primarily of people from the heavy repair element. Two people in each crew are shown from the infrastructure support element. In fact, it would be better to place all six of them in one of the three crews to keep them together. The taxiway repair team also has three crews, and most of the people come from the facility maintenance element except for the three heavy equipment operators needed.	

Table 5.38. Hauling Team.

Team Size: 36

Description of Activities: Delivers fill material and FOD covers to the crater repair crews.

Team Composition:

Number of People and Specialty	Source
16 infrastructure support technicians (any AFS) including the team chief	Infrastructure support element
5 facility maintenance technicians (any AFS)	Facility maintenance element
8 material acquisition technicians (any AFS)	Material acquisition element

Table 5.39. FOD Removal Team.

Team Size: 14

Description of Activities: Clears debris from the MOS and taxiway access routes to permit resumption of aircraft operations as soon as the crater repairs are complete.

Team Composition:

Number of People and Specialty	Source
6 infrastructure support technicians (any AFS)	Infrastructure support element
5 environmental flight personnel (any AFS)	Environmental flight
3 pavements & construction equipment (3E2X1)	Heavy repair element

Other Comments: The heavy equipment operators are needed to operate the graders. Any specialty can be designated as team chief.

Table 5.40. MOS Marking Team.

Team Size: 6

Description of Activities: Paints airfield markings for a new MOS and paints over old markings which would conflict with the new markings. Places edge and threshold markers.

Team Composition:

Number of People and Specialty	Source
4 structural (3E3X1)	Heavy repair element
2 engineering assistants	Engineering flight

Table 5.41. Spall Repair Teams.	
Team Size: 4	
Description of Activities: Repairs spalls.	
Team Composition:	
Number of People and Specialty	**Source**
4 facility maintenance technicians (any AFS)	Facility maintenance element

Table 5.42. MAAS Installation Team.	
Team Size: 6	
Description of Activities: Installs the mobile aircraft arresting system (MAAS) on the MOS.	
Team Composition:	
Number of People and Specialty	**Source**
4 electrical power production (3E0X2)	Infrastructure support element
2 electrical systems (3E0X1)	Infrastructure support element

Table 5.43. Shelter Management Teams.	
Team Size: 2-3	
Description of Activities: Stocks shelters and ensures proper operation of shelters to ensure contaminants do not get into the toxic free area.	
Team Composition:	
Number of People and Specialty	**Source**
1 shelter manager (any AFS)	Infrastructure support element
1 contamination control area monitor (any AFS)	Infrastructure support element
2 augmentees	Any CE shop
Other Comments: A shelter manager is assisted by a contamination control area monitor. The CCA monitor specifically make sure people process correctly into the shelter during NBC operations. Also monitors open air contamination control area processing when off-base dispersal is used in lieu of on-base shelters.	

Table 5.44. Firefighting Crews.
Team Size: Varies with manning of each crash-rescue or structural firefighting vehicle.
Description of Activities: These crews provide crash rescue support to the aircrews as soon as flying resumes and fight or control fires at critical facilities.
ource of Team Members: Fire protection flight.

Chapter 6

TRAINING

"Sending people into combat
without the proper training
is tantamount to murder."
General George S. Patton, Jr.

6.1. Introduction. Your plans can be perfect; your equipment and supplies can be on-hand; your unit and response teams can be well organized, and yet not be ready for war, military operations, or peacetime disasters. You must train for those contingencies--mentally, physically, individually, and as a team. Unlike units, such as aircraft maintenance, civil engineers' contingency tasks are not the same as those they do in the course of everyday work. Just as football teams have preseason practice to hone skills lost during the off-season and to incorporate new players on the team, civil engineers must have periodic practice to develop and maintain the skills needed to effectively respond to disasters, military operations, and war. Such training is inherently a unit responsibility. Ideally, that training should be conducted entirely at home station, but the reality of limited resources makes that impossible. Consequently, civil engineers must rely on home station training to prepare disaster responses and to develop basic skills for other contingencies. Both military and civilian personnel must be involved. For training on equipment not available at home station and for training in situations which cannot be re-created there, civil engineers must turn to the Silver Flag Exercise which prepares key members of mobile Prime BEEF teams to perform both force beddown and wartime base recovery tasks. There are other training opportunities for engineers, but these two programs--Home Station Training and the Silver Flag Exercise--are the training foundation for Air Force Civil Engineer contingency and disaster responses. While Air Force instructions prescribe contingency training requirements, your unit's success in dealing with a contingency or a disaster depends largely on how well you define your training needs, how often you train, and how well you plan and conduct it.

6.2. Overview. This chapter highlights CE contingency training requirements and shows how individual training and the two foundation programs satisfy many of those requirements. The classroom topics of category 1 and the "hands-on" lessons of category 2 home station training are discussed. You are introduced to other unit training for disaster response and a "leadership training work center" to improve leadership skills. Some special contingency courses are also mentioned. The target audience for this chapter is the Readiness Flight staff, the unit officers, and anyone tasked to conduct unit level training. While targeted to Prime BEEF units, the information is useful for RED HORSE squadrons as well.

6.3. CE Training Requirements. "What training is mandated? What skills do we need? Where can I find out what I should do?" These are the universal and logical questions everyone asks who has ever been assigned to train others. This section should help you identify individual and team training requirements for contingency and disaster responses. CE requirements are found in a number of Air Force publications, where most of the training requirements are adequately described. Rather than repeat the details, they are highlighted here and their source documents identified so you have a place to start. Some requirements, however, will result from your planning rather than from a publication. Most requirements can be grouped in one of the following seven categories: individual specialty skills, ancillary training, wartime and other contingency tasks, disaster response tasks, base orientation, leadership, and command and control.

6.3.1. **Specialty Skills.** Individual specialty skills are the basis for everything civil engineers do. When individuals are well qualified, not only can they do the routine tasks, but, more importantly, they can figure out work-around methods when standard procedures do not work. This ability to adapt is critical for contingency and disaster responses, and it comes with improved skills and experience.

6.3.1.1. The skill requirements are found in the Career Field Education and Training Plan (CFETP) for each Air Force enlisted specialty. Part 2 of the CFETP contains the Specialty Training Standard (STS) which outlines specific skills that everyone who holds that Air Force Specialty (AFS) are supposed to be able to do. It highlights tasks and associated skill levels which each person attending initial technical training must achieve to graduate as a Mission Ready Technician. It also indicates the minimum skills a person must have to upgrade his or her skill level. Ideally, when your people meet these standards, you can feel confident they will be able to perform when called on in a crisis. The CFETPs are updated periodically, about every 3 years, by experts in each AFS. While not exciting reading, each officer should quickly review all the CE STSs at least once. Mobility team leaders need to know what their people are supposed to be able to do. If necessary, a specialist in each specialty can explain unfamiliar skills and give an appreciation for how well qualified the people at your base are.

6.3.1.2. For US civilian employees, the performance requirements for CE trades can be found in the Office of Personnel Management (OPM) Qualification Standards. OPM standards do not apply to locally hired civilian employees at overseas bases, but you can find similar performance requirements for them at your Civilian Personnel Office. Individual job descriptions contain the most useful information.

6.3.2**. Ancillary Training.** The Air Force mandates a few training programs to ensure Air Force people have certain skills and knowledge which are not part of their specialty training. AFCAT 36-2223, *USAF Formal Schools* specifies the ancillary training programs. Civil engineers provide the training for three of the ancillary courses: Explosive Ordnance Reconnaissance, Emergency Power Generator Operator, and Base Emergency Preparedness Orientation. In addition to those three courses, civil engineers must complete four other ancillary courses: Self Aid and Buddy Care; Command, Control, Communication, Computer (C4) Systems Security Awareness, Training, and Education Program (SATE); Law of Armed Conflict; and Protection from Terrorism. There are other courses, but only the ones dealing with emergencies and contingencies are listed here.

6.3.3. **Disaster Preparedness.** AFI 32-4001, *Disaster Preparedness Planning and Operations* specifies mandatory training requirements to help prepare individuals and the base for peacetime disaster responses, wartime NBC defensive operations, and unit disaster preparedness. Currently, ten courses are presented to different people on base to satisfy these requirements.

6.3.4. **Emergency Response Training.** Civil engineers must make sure immediate response teams are well trained. Three areas come to mind: firefighting and crash rescue, disaster preparedness support for command and control, and hazardous material (HAZMAT) spills. HAZMAT response training requirements are extensive and often require formal certification. See AFI 32-4002, *Hazardous Material Emergency Planning and Response Compliance* for details.

6.3.5**. CE Wartime and Other Contingency Tasks.** Skilled individuals are critical, but skilled teams enable civil engineers to meet their warfighting and contingency responsibilities. Those team requirements are outlined in the *Prime BEEF Wartime Task Standard*. This *Standard* specifies tasks, team composition, and performance standards. It covers basic wartime knowledge plus mobilization, expedient repair and destruction, expedient field construction, expedient beddown, passive defense, base recovery, survivability support, crash rescue/fire protection, disaster preparedness, and explosive ordnance disposal tasks. While targeted to mobile Prime BEEF teams, the *Standard* also applies to most base civil engineer units overseas, and some tasks apply to CONUS base engineer units as well. While many of the items are identical, a separate *Wartime Task Standard* includes the unique requirements for the RED HORSE units. Both documents are updated periodically. Should you need a copy, contact your major command.

6.3.6. **Unit Orientation.** Unlike most CE training requirements which are relatively universal, a few apply only to your base or unit. There is no comprehensive list, but these ideas may trigger your thoughts.

- Job assignments and responsibilities
- Location of equipment
- Location of supplies
- Utility system isolation procedures
- Priority units and facilities
- Recall procedures and personal responsibilities
- Alarm signals
- Seasonal hazards and protective actions
- Attacks, major accidents, and natural disasters which are possible
- Command and control and passive defensive measures

The last two topics are part of the installation information program which is covered in AFI 32-4001. Orientation requirements could be incorporated into other sections in this paragraph 6.3, but are treated separately to give them visibility. The actual training should be combined with in-processing activities and other training whenever possible. Any CE forces deploying to help you also need this training and information. Make checklists to help you remember the points to cover with augmenting forces.

6.3.7. **Leadership.** Effective leadership is the one universal and essential requirement a team, flight, or squadron needs in order to meet its mission taskings. The more critical and time sensitive the tasks, the more important good leadership is. Developing leadership skills can begin at school, but those skills can only mature in the field. Junior officers are often in charge of Prime BEEF and RED HORSE teams and sent on deployments to "help" them develop their skills. Some do well in such "tests by fire". Others do not. But in any situation, it is not fair to the team or the leader when he or she is not adequately prepared and trained. The structure of the civil engineer squadron provides good leadership opportunities for a few officers, but not for all. You can create opportunities at home station to help your officers and NCOs develop and practice their leadership skills, especially those who are not currently in leadership positions.

6.3.7.1. The focus should be on junior officers and junior NCOs. When this is done well, the unit automatically creates a pool of experienced leaders in just a few years. Begin by giving them challenging jobs in local exercises. Have them set up and conduct a unit training program or lead a bivouac. You can form your junior people into teams and give them construction projects to design, plan, order materials, and build. Junior leaders need to learn to look after their people and to complete their mission on time. This can be done through ad hoc construction teams or a more permanent "leadership training work center". The training opportunities are limited only by your unit's imagination and willingness to try.

6.3.7.2. Whatever challenge the junior people are given, they need to be told what their task or job is to be and understand from you or the commander what is expected of them. They need to be trained. Then turn them loose. Watch the energy, initiative, and resourcefulness of junior people. Use unit training and local exercises or construction projects to test them. The junior people need oversight and constructive feedback. More so at the beginning, and less as they gain experience. This is not solely the job of the commander. A unit's senior officers and NCOs have an obligation to guide their juniors. There is nothing wrong with a senior NCO giving private counsel to a junior officer. Hopefully, junior officers will recognize the value and ask for such feedback.

6.3.7.3. The commander needs to create the environment and set the tone for the senior people's participation. It takes an ongoing commitment to train the junior people, because there are always new ones joining the unit. In the short term, it seems like a sacrifice to take the lieutenants away from the drawing board and the junior NCOs out of the shops where they can be "productive". But training the next generation of leaders is a fundamental job of all CE senior people.

6.3.8. **Command and Control.** This is another requirement which could be incorporated into the other categories. But like leadership training, it is critical to the success of CE responses and needs emphasis. This section highlights just two training topics which officers, senior NCOs, and key civilians need to prepare them to effectively direct a unit's responses to crises, disasters, contingencies, war, or any other military operation. You may think of others.

6.3.8.1. **OPLAN Familiarization.** Unit leaders need to become familiar with the requirements of the operations plans (which affect the base), the base support plan, the Base OPLAN 32-1, the CE Contingency Response Plan, and any hazardous material spill plans. These people should also be exposed to the checklists which support the plans. While not everyone will become experts on each plan, each person should depart from familiarization sessions knowing what his or her section must do to support each plan. Review the list of plans in chapter 3. Before conducting those sessions, decide which plans are most important. You do not need to cover them all in one sitting. Then prepare well for these sessions. Short handouts speed the learning process and help you focus your presentations.

6.3.8.2. **Control Center Familiarization.** People with jobs in the CE Control Centers (Damage Control Center, fire protection alarm room, etc.) or the Survival Recovery Center need to become familiar with the layout and resources in their control center. They need to know what sources of information are available and how to use the communications equipment.

6.3.9. **Common Sense Requirements.** Remember, the common sense approach to training requirements always applies. If you have to plan for something, then train for it. If you do not see it written, but you know you need to do the task, train for it.

6.3.10. **Requirements Versus Programs.** Table 6.1 should help you see which training programs help satisfy the requirements presented in this paragraph. The training programs are discussed in some detail in the following paragraphs.

6.4. Individual Training. Home Station Training and the Silver Flag Exercise may be the foundation for CE contingency responses, but individual specialty skills remain the bedrock. The Air Education and Training Command (AETC) teaches basic skills to enlisted military people before they report to their first base, but these airmen do not arrive fully qualified in all tasks. Using the football team analogy again, the airmen come to the team with basic skills, but they need to improve on those skills to be effective team players. Each person does it through on-the-job (OJT) training, Career Development Course (CDC) self-study, and other contingency training. Qualification Training Packages (QTP) will increasingly be used for upgrade training and, in some cases, for refresher training. Civilian employees also come to the job with at least minimum skills and can improve their skills on the job. Just as with the military, they can attend AETC courses to acquire additional skills. Your influence on individual training is limited, but you can do a few things.

6.4.1. **Demand Good On-the-Job Training.** Most supervisors do a good job with OJT. However, if you consistently see people from a shop who cannot perform a required task, look at the OJT program in that shop. It is probably weak. Use the senior NCOs to find and fix these type problems. Occasionally, there are some supervisors who are willing to pencil whip requirements to "help" a friend or to make their records look good. That practice is illegal, and it is unfair to the people who study hard and practice to earn their upgrade. It also misleads the commander and the unit about its capabilities. If someone arrives in your unit who is unqualified to perform a needed task, get them back on training status, even if he or she was previously qualified. You do not want to unknowingly put under-qualified people in charge of a task.

Table 6.1. CE Training Requirements Versus Training Programs.

Requirement	Training Program												
	Individual Training				Home Station Training							Silver Flag	Special Trng
	Tech School	OJT	CDC	QTP	Cat I	Cat II	Ancillary Trng	Installation Disaster Prep Training	Other Unit Trng	Base Exercises	Trng Work Ctr		
Specialty Skills	Ÿ	Ÿ	m	Ÿ							Ÿ		
Ancillary Training					m	Ÿ	Ÿ				Opt		
Wartime/Other Contingency Tasks	Ÿ	Ÿ	m	Ÿ	m	Ÿ	Ÿ	Ÿ	Ÿ	Ÿ	Opt	Ÿ	Ÿ
Disaster Preparedness								Ÿ					
Emergency Response Tasks									Ÿ	Ÿ			
Unit Orientation									Ÿ	Ÿ			
Leadership						Ÿ			Ÿ	Ÿ	Ÿ		
Command and Control						Ÿ		Ÿ	Ÿ	Ÿ		Ÿ	
Physical Conditioning									Ÿ		Ÿ		

Key to symbols: Ÿ- indicates knowledge and hands-on skills obtained m - indicates knowledge only
Opt - Optional. Selected hands-on skills can be included.

6.4.2. **Set Up a Study Center.** Many bases have already done this in the fire department and some in a separate training section. Make it comfortable and attractive. Load it up with current study materials including CDCs, videos, computer programs, etc. Provide more than one VCR to support multiple training activities simultaneously. The need for VCRs will grow as more training information is put on that media. Keep the study center quiet. Use headphones when possible to keep the noise levels down. Since multi-media computer based training will become an increasingly valuable training tool, add fast computers (with a lot of memory) to the study center--at least two computers to begin with. Try to keep the study center open during other than normal duty hours. This will require experimentation with the hours to determine when your people are best served. Since all shops benefit, the manpower burden to keep the study center open can be shared among the shops. Rather than operate it by a duty roster, designate people for a 3- to 6-month "tour" to keep it open during the non-duty hours. The designated people must be trained so they can teach others how to use the equipment; know where to look for requested study materials; and know the procedures to loan materials. Rotate these people so the same ones do not always get stuck with the least desirable hours. The usefulness of the study center will increase as the category 1 home station training program evolves and other multi-media training is added such as Qualification Training Packages.

6.4.3. **Encourage Officer Professional Reading.** There is no Career Development Course for CE officers, but that does not diminish their obligation to develop their contingency skills. Each officer should make a personal commitment to thoroughly read each of the volumes in this pamphlet series before he or she completes 2 years of service. This obligation also extends to reviewing the referenced documents and learning what information they contain.

6.5. Home Station Training. Home station is the primary place to develop the basic skills your unit needs for military operations and disaster responses in war and peace. Some home station training is mandated. Other elements are not, but all are targeted to building capable teams. How important is home station training? For 70 percent of the Prime BEEF team and all others not on mobility, this is the only contingency training they will receive. This section explores six home station training programs: category 1 "classroom" training, category 2 "hand-on" training, ancillary training, other unit training and exercises, base exercises, and the leadership training work center.

6.5.1**. The Traditional Approach.** Traditionally, each unit relied on category 1 "classroom" training to provide the basic knowledge and category 2 "hands-on" training to provide the experience. Because of limited guidance and training material, each base had to develop its own lessons. Too often this translated into showing films, watching slide-tape programs, and listening to briefings--some good, some not. And once a year going out on a bivouac. In between, units participated in wing recalls and mobility and disaster response exercises. The limited guidance was not specific on who should, nor on what should be trained. Usually this meant everyone on the Prime BEEF team got the same training. There was not time to do everything, so units trained on a few topics in each category called that good, and reported training complete in SORTS (Status of Resources and Training System). Consequently, as new people arrived and old ones rotated, a unit could not be assured any of its people had ever been trained in all of the contingency skills it needed. In spite of the lack of guidance, many CE units did an excellent job of training and proved themselves very capable in crises. Unfortunately, some did not.

6.5.2. **Wartime Task Standards.** To correct this lack of training guidance, HQ AFCESA (then HQ AFESC) prepared the *Prime BEEF Wartime Task Standard*--and later, printed the *RED HORSE Wartime Task Standard*. As indicated earlier, these documents outline in considerable detail the capabilities each theater in-place CE unit and each Prime BEEF or RED HORSE team must have, the knowledge they need, and the tasks they must perform. By default, each listed task and each knowledge requirement is a training requirement.

6.5.3. **Courses of Study.** HQ AFESC wrote and distributed the *Prime BEEF Home Station Training Courses of Study* in 1990-1991. The *Courses of Study* are detailed instructional packages providing material for both category 1 and 2 training. The lessons are based on the tasks listed in the *Wartime Task Standard*. Each lesson targets only the specialties which need the information or must perform the task. Each package contains instructor guidance, a detailed lesson plan, and paper copies of viewgraphs which can be used to augment any classroom presentation. The instructor guidance gives the lesson objectives; identifies the target population; lists needed training aids; highlights the source documents; offers instructional hints; and suggests which specialty should lead the lesson. On many topics, the lesson plans contain considerable detail, certainly more than an expert or a trained instructor would need. This was intentional. The detail is provided to help an untrained, but willing instructor get smart. The *Courses of Study* are valuable reference documents, particularly the RRR volume. If you cannot find your unit's copy, ask your major command. The *Courses of Study* do not contain AFS specific lessons for EOD or disaster preparedness.

6.5.4. **Category 1 Training.** "Cat 1" knowledge-only training provides the baseline information CE people need to perform contingency tasks as a team. It prepares them for category 2 hands-on training and is an important pre-requisite for Silver Flag Exercise activities. Category 1 training takes on added importance when it is the only way to expose CE people to a task because units do not have the needed equipment or resources for hands-on training. General category 1 training topics are listed in AFI 10-210, *Prime Base Engineer Emergency Force (BEEF) Program.* Detailed requirements are found in the *Prime BEEF Wartime Task Standard*. New technology will open more effective options for category 1 training. The computer will allow units to eliminate many classroom lectures and to get individuals more involved in their own training. The near term goal is to build a complete category 1 program which uses up-to-date training videos, puts the reference and study materials extensively on CD-ROM, and uses a uniform computer-based evaluation system.

6.5.4.1. **The Current Approach.** Each Prime BEEF team member is required to complete selected lessons based on his or her AFS. Lessons are built around the category 1 requirements in the *Wartime Task Standard*. For each lesson, the individual must read selected references or watch one or more audio-visual programs. (The preferred study media is video, but there are not yet videos which adequately treat each required topic.) After studying the material, the person takes a computer generated evaluation to ensure he or she has gained the needed knowledge. Results are retained in the computer. Individuals must pass the evaluations to receive credit for category 1 training. When individuals transfer to other units, they can take the evaluation results with them.

6.5.4.2. **The *Home Station Training Guide (Category 1)*.** The guide contains lesson requirements, individual lesson instructions, administrative instructions for the program manager, and the computer programs on CD-ROM discs. The lesson requirements list the lessons, identify which specialties get which lessons, and specify the frequency for repeating each lesson. The individual instructions for each lesson tell what study materials a student is to view or read to prepare for the evaluation. The program manager's administrative instructions provide detailed information on hardware requirements plus instructions for using the computer software and for reporting evaluation results. The instructions also provide a comprehensive list of required study materials. When necessary, hard-to-find reference materials are included on the CD-ROM disks.

6.5.4.3. **Increased Individual Responsibility.** The big change from previous approaches is that the individual becomes responsible for his or her category 1 training. However, there is an administrative tail for the Readiness Flight or whoever is put in charge of category 1 training. You have to make sure the computers are available; keep the reference materials and videos on-hand; make sure VCRs and TVs are available; explain the program and distribute lesson instructions; and schedule people to take the evaluations. Scheduling can be a burden, so try to make it as easy as possible. One method is to give people a 1- or 2-week time window to take the evaluations, and place the obligation on them to reserve specific times. The evaluations are not easy. Be sure to set aside time to accommodate people who have to take evaluations a second or third time. The need to monitor people taking the evaluations means you must place the computers in one location. The study center mentioned earlier would satisfy this need.

6.5.4.4. **Audio-visual Support.** Many of the training lessons call for video or slide-tape programs. Slide-tape programs are no longer available in that format. Those programs have been placed on video tape with the same identification number. Eventually those programs will be updated. Attachment 6 contains a list of available products and explains how to order them.

6.5.4.5. **The Future.** The logical evolution for category 1 training is to take full advantage of the power of multi-media computers and go interactive. For most topics, key information from printed study guides and reference materials will be put into the computer, and video and graphic material added to create truly interactive instruction. When this occurs, assuming most computers are equipped with CD-ROMs, CE people will be able to perform the interactive training in their shops and offices and even in their quarters. However, since not everyone will have a computer, there will still be a need for a study center and a place for people to take their evaluations.

6.5.4.6. **The Classroom Is Not Dead.** Even with the advent of the computer, there is still an occasional need for classroom instruction, especially when the instructor feels the students will learn more by discussing the topic or they need to get ready for category 2 or Silver Flag activities.

6.5.5. **Category 2 Training.** The ideal way to train on a task is by doing it and repeating it until the trainee can do it well, and that is the thrust of category 2 "hands-on" training. Category 2 topics are highlighted in AFI 10-210. The detailed requirements are listed in the *Prime BEEF Wartime Task Standard*. Comprehensive guidance for training many of the category 2 requirements are contained in the *Prime BEEF Home Station Training Courses of Study*. For topics which do not have a lesson plan, you must develop your own. Often you can combine the training of many tasks into a single training period. On the other hand, complex tasks or those which require a lot of people can be broken down into sub-tasks. Frequently it is helpful to train smaller size crews in the sub-tasks before attempting to train an entire crew or team in the full task. With few exceptions, train your people in small groups of 10 to 15 people. You get better results. Category 2 training is mandatory for your people, but it can be fun. It takes more effort to set up such a training program, but it is worth it. Train your people well the first time. When you do, they will require less frequent refresher training and those refresher sessions will not last as long. Some observations concerning the general category 2 topics follow.

6.5.5.1. **Government Vehicle and Equipment Operations Training.** Rapid runway repairs in a high threat environment require a lot of vehicles moving at the same time to make the needed repairs. In that situation, a typical CE unit has too few heavy equipment operators. To solve this shortfall, civil engineers must train other people in the unit to operate selected vehicles. AFI 10-210 outlines the requirements. Overseas bases should have little trouble meeting these requirements if they have the equipment on-hand. CONUS Prime BEEF units have an impossible challenge without the equipment. Consequently, train with the equipment you have. Borrow items from other bases. Send your people to the Regional Equipment Operator Training Sites. The demise of the Warsaw Pact threat has reduced the impetus for this training, but civil engineers still need to be able to perform rapid runway repairs and still need in-house augmentees to help operate some of the vehicles. Occasionally, you may find some heavy equipment shops which, for their own reasons, do not "let the young kids operate the big stuff". That practice hurts your unit's contingency response capability. If you find such a pattern, work with the element leader to change that practice.

6.5.5.2**. Unit Chemical Biological Warfare Defense (CBWD) Training.** Basic CBWD training is provided through the Installation Disaster Preparedness Training Program as outlined in paragraphs 6.3.3 and 6.5.7. However, additional unit training is required to gain proficiency. This includes task qualification training, equipment and large area decontamination training, shelter management training for selected people, and training to process in and out of a toxic free area. Each unit is required to ensure its people can perform their wartime roles in a chemical or biological warfare environment. For civil engineers, this means base recovery activities. Overseas bases have the advantage again because they have the equipment available. When you cannot qualify your people in a specific task, pick other tasks which they must do in a base recovery mode and have them qualify in those. The biggest need is for your people to experience the physical limitations they face when performing base recovery activities in chemical warfare defense ensembles. During task qualification training, your people should also practice equipment decontamination and shelter in and out processing. You do not need a shelter to practice the steps. Open air contamination control area processing can be performed. Spray people and equipment with a telltale chemical before they decontaminate equipment or themselves. Under an ultraviolet light, the absence of the telltale chemical shows if they were successful. Make sure your people are serious about doing this training well. The chemical threat is very real, especially when facing a weaker enemy.

6.5.5.3. **Weapons Training.** Getting quotas can be a problem, especially for units which do not have a small arms range on base. Good communications and good working relationship with the combat arms training shop will eliminate most problems.

6.5.5.4. **Expedient Methods.** This is the element of category 2 training where civil engineers have the most tasks to do, and consequently, it should get the majority of category 2 time. It is unlikely your Prime BEEF team or base CE unit could train in every expedient task each year, and it is unnecessary. Pick the tasks your unit needs the most, not just the easy ones. To maximize training opportunities, include some of these tasks in base exercises as well as during your regular unit training. Try not to do the same things each time unless you need the practice. Training in expedient methods can be time consuming and the material costs can get expensive. Look for ways to cut time and costs, but be sure your people do enough of a task to learn the skills. To decide if training is adequate, answer two questions. Can we do the job? And on time?

6.5.5.5. **Expedient Beddown.** Give emphasis to beddown skills, because those are the tasks civil engineers will be called on to use most often during contingencies in the foreseeable future. Unfortunately many of the assets are not available at home station. To compensate for this shortfall, you need to emphasize the information learned in category 1 training and make sure the people who attend the Silver Flag Exercise become "experts". Some units have had limited success in building up their home station training kit by "scrounging" salvageable assets from Defense Reutilization and Marketing Offices (DRMO). This takes a dedicated effort to first find the items and then to make sure the stuff is serviceable. You need to establish good phone contacts with DRMO people and be willing to quickly dispatch people to other military installations in the area to look at and pick up items. Some people are naturals at this. Use them.

6.5.5.6. **Expedient Field Construction.** You will probably have very few opportunities for your people to train in expedient field construction. From a base perspective, you do not need or want very much of it around. However, it does fit in with a base exercise area if you have such a thing. Be sure your Prime BEEF team knows how to construct expedient field sanitation facilities. It is a good bet your unit will need that knowledge sometime. Especially important is knowledge of field latrines, grease traps, and soakage pits. Knowing how to construct GP medium tent hardbacks may be helpful, although this is becoming less important as TEMPER tents are used more.

6.5.5.7. **Expedient Repair and Destruction Methods.** Except for rapid runway repairs, it is difficult to train in expedient repairs, especially to facilities and utility systems, because you never know what the actual damage will be. This is an area where civil engineers must rely heavily on the skills of individuals to figure out what to do when actually faced with a problem. Overseas bases, which have the equipment, need to practice rapid runway repairs and all associated activities. While many tasks associated with the filling of craters cannot be trained at other bases, civil engineers can always train in damage assessment, MOS selection, and RQC calculations. You can also conduct exercise talk throughs or run RRR "sandbox" exercises with team chiefs. This is not a suitable substitute, but it is often the only one you have. It does help people see the sequence of activities and anticipate where likely problems will occur. Likewise, you can conduct walk through training for base denial. Show (versus tell) your people in peacetime what they might have to do, where they would do it, and what materials they could have available. This gives them time to think how they would perform denial and in what sequence.

6.5.5.8. **Security and Base Defense.** Your training in basic defensive combat skills and work party security should concentrate on the basics: such as detection methods, sign/countersign measures, rules of engagement, and reporting procedures. Training in command, control, communications, and signals is especially important. The best way to accomplish this training is to ask the security police unit to provide the training or lesson plans.

6.5.5.8.1. Find out if, how, and when the security police plan use your unit in air base defense operations. Train for those roles. Convoy security is also important. On more than one occasion in Vietnam, civil engineers found themselves providing their own convoy security.

6.5.5.8.2. Except for RED HORSE, civil engineers are weapons limited. You have no crew served weapons (like M-60 machine guns), mortars, grenades, etc. Without those items, your people are limited to hunkering down, calling for help, and returning fire as best they can when attacked. Make sure your people know how to do those three things effectively. Training should answer at least these questions for your students. What do I do first? How do I quickly determine the source of attack? Where am I supposed to shoot? What signals do I use? How do I keep from shooting friendly units coming to help us? Who do I call for help and by what means? What do I do if receiving indirect fire?

6.5.5.8.3. It takes considerable training to perform security roles well, and you have only limited category 2 training time. Because priority must be placed on primary CE tasks, you need to plan security training well. Any time you spend on security comes at the expense of other training. The better you train your people the first time, the less time you will have to devote to refresher training.

6.5.5.9**. Passive Defensive Measures.** Specific category 2 requirements are listed in the *Wartime Task Standard*. Passive defense topics should include camouflage, concealment, and deception (CCD); resource dispersal; expedient hardening; blackout procedures, etc. Be sure your people know how to put up camouflage netting so it is effective and functional. Ever see cam netting placed over a CE vehicle and the netting have to be taken down to move the vehicle? That happens all the time when people do not know how to do it correctly. There are, of course, many other CCD topics to train. Many of these topics can easily be added onto other lessons and to base exercises.

6.5.5.10. **Field Training.** The annual field training is an opportunity to devote time to only contingency training. Rather than training on individual topics, it is a time to put many of them together. An overnight bivouac is the minimum, but you need 3 to 5 days to pack in enough training for the bivouac to be truly beneficial for a Prime BEEF team. You do not have to take the entire unit at one time. Split the unit up for field training. The training will be better; there will be less wasted time, and more people will get leadership experience. Put a different officer and NCO in charge of each group and make them responsible for planning and conducting the training and arranging for support. The commander or Readiness Flight chief should only have to give the training objective to them. Allowance Standard 429 lists the Home Station Training Set assets each unit should have to help conduct this field training. Be sure you have all those resources. Consider joint training with services, security police, and other support forces. Their participation adds realism and builds good working relationships. If you do train together, practice cooperation with them and demand it by your people. Avoid blaming others when things go poorly. Concentrate on fixing problems which arise.

6.5.6. **Ancillary Training.** All ancillary training can be taught separately, but some topics are easily incorporated into category 1 and 2 training. Explosive ordnance reconnaissance and self-aid and buddy care are examples. They can easily be included in field training as well. OPSEC and COMSEC are classroom activities, but they have a "hands-on" application. CE people need to be sensitized to their OPSEC and COMSEC actions during exercises. There is no excuse for CE people not getting emergency power generator operator training. Every CE officer and NCO should know how to start up the smaller emergency generators.

6.5.7. **Installation Disaster Preparedness Training.** This important training currently covers ten courses: chemical biological warfare defense; shelter management team; contamination control team; disaster preparedness support team; disaster control group; camouflage, concealment, and deception; disaster preparedness unit representative; exercise evaluation team, and the base emergency preparedness orientation course. Civil engineers provide this training for the entire base. These courses are presented using standardized lessons which are adjusted to meet local conditions and threats. To help civil engineers prepare the courses, attachment 5 supplements the guidance in AFI 32-4001.

6.5.8. **Other Unit Training.** There is other training civil engineers should do. These tend to be base unique requirements and items which do not fit well into other categories.

6.5.8.1. **Physical Fitness.** Engineers must be in good physical condition to handle the strenuous tasks inherent in contingency operations. Good physical conditioning is important to CE readiness. CE firefighters and EOD technicians have had a physical conditioning program for years. In fact, the fire program was the model for the Air Force. Physical conditioning is a personal responsibility, but CE units can help by emphasizing the value of physical conditioning. One way is to conduct weekly physical training sessions, as many units currently do. Consider asking the Services unit to help you develop a unit or individual fitness program. Physical fitness is important in contingencies and battle. A person can endure the stresses of battle better and longer--both physically and mentally--when the body is fit.

6.5.8.2. **Unit Orientation.** People need to be oriented to the base. During in-processing and the first few weeks on the job, a number of topics must be covered.

- Job Assignments and Responsibilities. Each person needs and deserves to know what tasks he or she could be asked to perform in a contingency or disaster. He or she needs to know where to report and what equipment and supplies to bring. And everyone needs to practice or walk through their tasks at least once. If a person has a specific job during a contingency, he or she needs to know what it is, what the responsibilities are, and where to report. Do not forget the jobs which backup someone else.
- Location of Equipment. CE craftsmen need to know what equipment is available, where it is located, and how to operate each item. They need to know how to get the equipment and where to find the keys.
- Location of Supplies. Show new people what supplies are available and where they are located. Explain the procedures to get the materials.
- Utility System Isolation Procedures. Utilities people need to know how to isolate water and electrical systems. They need to know where main water shut off valves are located, where circuits can be killed, etc. They need to know any special safety considerations. This information should be included in the CE Contingency Response Plan, but it must be passed along and practiced. This information is often needed for day-to-day activities, but occasionally one sees the knowledge residing with only one or two people. It will stay that way if the knowledge is viewed as job security. Superintendents and element leaders must be involved to overcome such a situation.
- Priority Units. Some units on base, by the nature of their mission, enjoy a high priority and deserve more urgent attention when they call for CE help. This knowledge is not self-evident. Be sure all CE people understand which facilities get priority attention.
- Recall Procedures. Be sure your people are briefed on recall procedures and their responsibilities to contact others.
- Alarm Signals. Your people need to know what the local alarm signals mean and what they should do when they hear a signal. This is especially true at overseas locations where alarm signals and meanings can vary because of agreements with host nations.

The natural inclination is to assume base-unique training "automatically" takes place. The shop foremen or NCOICs usually do it well. But there are numerous cases when this training was not adequate and the CE responses were degraded. Make sure good base-unique training happens by encouraging each shop chief to incorporate contingency related requirements into his or her newcomer's orientation checklist. Checklists can be useful for orienting the more senior people when they arrive as well. Some orientation activities such as learning the location of valves should be hands-on. This reduces problems such as finding a valve for the first time at night with only a base utility map to try to locate it.

6.5.8.3. **OPLAN Reviews and Exercise Preparation.** Do not wait for base-wide exercises to see how well you can respond to disasters and contingencies. CE units should periodically run their own OPLAN reviews and pre-exercise drills. These can be done to get the unit ready for a specific base-wide exercise or to make sure the unit is prepared for actual contingencies. The emphasis should be on command and control and communications. That is where units tend to have the most problems.

6.5.8.3.1. Everyone who leads a response team should be involved. This is their best chance to learn what their teams may be called on to do. Then they can decide what they must do to get their teams ready. The number two person on each team should also be involved. Some might argue the experienced unit leaders who have been around for some time are wasting their time. Not true! Since they have "heard and seen it all before", their insights can help educate the newer folks

6.5.8.3.2. OPLAN reviews and exercise preparations can be done as briefings, talk-through sessions, walk-through drills, command post exercises (CPX), and full up unit exercises. All have their advantages, and all have essentially the same purpose: get people informed so they know how and when to respond. Briefing the entire unit consumes a lot of manhours, but you can ensure everyone hears the same message and you can minimize rumors. It can also be a morale booster if done well, but you may want to reserve this for major inspections. More often, you will meet only with team leaders or shop chiefs--or fewer people, if that is all you need. These sessions are good opportunities for the participants to "talk through" an OPLAN or exercise and resolve support problems. Use the checklists for the plan being reviewed. Find out if they are adequate. When the session ends, the participants should understand what is to be done, by who, and in what sequence. You want to work out task timing and highlight critical support requirements. Ask each leader to list what his or her team or shop must do to get ready, to set the dates he or she plans to have all preparations complete, and to identify all limiting factors and capability shortfalls. As people become more experienced, these sessions can be completed faster.

6.5.8.3.3. Sometimes you need more than talk. A walk-through, talk-through drill in the field helps people see what they must do and what resources they have. With these drills, you want your people to actually step through the tasks in order. Speed is secondary to learning the what, who, when, where, how, why, and in what sequence. Walk throughs are helpful to train new people; to teach tasks which are complex; to deconflict activities which involve a lot of people whose efforts could easily interfere with each other; to resolve timing problems; and to help people sitting in control center jobs to understand what happens in the field. Walk throughs can involve just a few or all the leaders, or you can target specific crews or teams which may be having problems.

6.5.8.3.4. A unit CPX in the CE control center (or Damage Control Center) can help you fix command and control problems without impacting your workforce. These sessions are good for getting new people and augmentees familiar with the control center facilities and their job in it. A CPX allows the participants to develop communication and COMSEC procedures, work out the flow of information, and gain experience in making base recovery and resource allocation decisions in a hectic environment. Any other CE control locations can be added into these exercises, such as the fire alarm room.

6.5.8.3.5. It is time for unit exercises when your people know what to do but need practice to do it well. Frequently, complex tasks must be repeated to get the timing right. You can waste a lot of valuable time on unit exercises if your people and leaders are not prepared. Use a combination of these pre-exercise activities. For example, start with a talk through with the leaders. Have walk throughs with a selected team or teams. Then conduct a limited unit exercise. Very rarely do you need to get every section and shop involved. The exception might be for a rapid runway repair or base recovery after attack practice at an overseas base.

6.5.8.3.6. Adequate exercise preparations will enable CE leaders to answer at least these questions:

- What is supposed to happen?
- What am I expected to do?
- What resources--people and equipment--do I have to work with?
- What do I and my team have to do to get ready?)
- Who supports me?
- Who is my boss?
- How am I to communicate? By messenger, phone, radios? And with who? Are there any codes?
- Are there any special rules to follow?

6.5.8.4. **Certification Training.** Be aware that some CE specialties must be specially trained and certified to perform certain tasks. This is especially true in the fire department, EOD flight, barrier maintenance, and utilities shops. Learn what tasks require certification. For example, you do not want to deploy to a bare base, install a mobile aircraft arresting system (MAAS), and find you have no one qualified to certify the MAAS is ready to catch planes. Firefighters and others in the unit must be certified on some HAZMAT tasks. The best way to find out about certification requirements is to ask each shop foreman. Share that information with all the CE officers.

6.5.8.5. **War Stories.** Invite people who have been on real world deployments to relate their experiences, share their lessons learned, and identify the problems they encountered and the solutions they developed. "War stories" are an invaluable and interesting way to expose junior people to the potential problems they can encounter. Find the people in your unit with interesting deployment experiences. Invite people from other base units who can offer different perspectives. Experiences can be shared with the entire unit or targeted to the people in a shop or on a team.

6.5.8.6. **CE Officer's Call.** Give it any name you want, but a periodic gathering of the unit officers can be used to help prepare officers for their leadership responsibilities. Almost any topic is valid. Topics can come from daily experiences, home station field training, or Prime BEEF deployments. Successes and failures should be highlighted. Getting people to talk about their failures can be tough, but those are often the most useful topics. Officer development should be the focus, but you do not have to limit attendance to officers. Civilians and especially your senior NCOs can contribute to and learn from the discussions. Shop visits can be a good Officer's Call activity. Periodically have the officers visit a different shop. Each flight chief or shop foreman should give a tour and highlight shop capabilities, limitations, and the biggest challenge he or she faces. Be sure to look at all utility systems. Also visit the EOD, fire protection, and readiness flights. These visits help officers to know who is in charge of each flight or shop and help them to understand the unique features of their unit and base.

6.5.8.7**. Augmentee/Unit Integration Training.** Augmentees, whether individuals or Prime BEEF teams, require some training to effectively support your unit. Disaster Preparedness Support Team augmentees are trained through the formal course presented in the Installation Disaster Preparedness Training (attachment 5). Ideally, EOD augmentees get recurring training one to 2 days per month, but they can also get a crash course when hostilities threaten. Prime BEEF or other teams which deploy to your base must get area and base familiarization training. They may also need some base unique task training. Try to identify these training needs in advance and develop lesson plans for them. Include training requirements and list responsibility for conducting that training in the Contingency Response Plan. Recurring peacetime training is the ideal, but some training is just as effective if presented when an attack or disaster is imminent. Some tasks are so easy to master that training can occur on-the-job after a disaster or attack. Your unit must determine the timing, content, and frequency of augmentee training.

6.5.9. **Leadership Training Work Center.** This is a new name for an old practice. The leadership training work center provides unique opportunities for junior officers and NCOs in the unit, who have limited opportunities otherwise, to gain leadership experience. The concept is simple. Pull airmen and junior NCOs from the CE work centers and team them with a junior officer. Give that team a moderate-sized construction project which requires multi-skills to complete. The officer/NCO leaders must organize and motivate their team to get the job done on-time and look after their people in the process. Their project should be something they can be proud of when finished.

6.5.9.1. If possible, allow a team to work its project from cradle to grave. Have them design the project; develop the material requirements; identify people and equipment requirements; prepare a construction schedule; and, finally, do the work. Invariably, participants find the experience useful and enjoyable.

6.5.9.2. This is not a new concept. It has been done for years at bases, but on an ad hoc basis. RED HORSE does it routinely. The work center approach makes it a more permanent activity and recognizes the on-going requirement and obligation to train the unit's junior members. There will always be new people to train. Additional thoughts on setting up a leadership training work center can be found in attachment 7.

6.5.10. **Base Exercises.** Civil engineers do not respond to disasters and contingencies alone, but as part of a base team. To be effective, that team must periodically practice integrated responses to peacetime disasters and wartime attacks through base wide exercises. Such exercises help CE people get familiar with support they must provide to others, and highlight the support civil engineers need from others. Engineers must be willing and cooperative players. The next chapter is devoted to base exercises and evaluations.

6.5.11. **Annual Training Schedule.** To provide visibility and control to home station training, each unit should prepare an annual training schedule. It does not have to be complicated. The key is to pick the tasks which the unit most needs and which it has the resources to do. Next, determine how much time is needed to train each task and which ones can be grouped together. Identify prerequisite training for each task, because you need to schedule that first. Then create the schedule. Some may argue that with all the external inputs on CE, you cannot keep a schedule. The counter argument is with all the external inputs, you need a schedule to help you meet all your commitments. The schedule certainly can be changed, but you should follow it as closely as possible. That keeps you from having to go through all the work of cancelling and rescheduling support from others.

6.5.12. **Future Directions for Home Station Training.** There are three significant developments for home station training on the horizon. First is the increasing use of computers, computer based training, and interactive video programs to present the category 1 lessons. Conceptually all category 1 training will be done that way. Second, training guidance will be consolidated and expanded in the form of a Home Station Training Guide. The guide will be your source document to identify all the standard lessons which need to be trained at home station. It will specify which lessons the people in each specialty are to complete and how frequently. Third, the material in the *Prime BEEF Home Station Training Courses of Study* will be updated and reformatted as part of the standard Training Packages (RTP). RTP listings can be found in AFIND 11, *Index of Readiness and Disaster Preparedness Training Packages*.

6.6. Silver Flag Exercise. The Silver Flag program is essential to civil engineer readiness training. Many contingency tasks simply cannot be trained at home station. For example, few bases have sufficient real estate, mission flexibility, or equipment to repeatedly blow holes in the runway so the Prime BEEF team can practice rapid runway repairs. Neither do civil engineer units have the mobile facilities and utility systems to practice setting up a bare base. Silver Flag Exercise sites are free of many or all of those home station constraints and resource limitations.

6.6.1. The program provides intensive, hands-on team training and certification for Prime BEEF personnel in traditional engineer skills as well as in firefighting, disaster preparedness, and explosive ordnance disposal (EOD) skills. A core of people on each mobile Prime

BEEF team (about 30 percent) train in special tasks the team needs to support air operations anytime, anywhere. The core people then lead and train their teammates during those contingency operations. The individual and team task certification is an important tool to demonstrate the training readiness of the mobile CE force.

6.6.2. The curriculum focuses on preparing crews (versus individuals) to perform both beddown and base recovery tasks. Students are grouped by functional area (technical specialty) into crews for specialized training, task evaluation, and certification. The Silver Flag topics are listed by specialty in attachment 8. So that students see the "big picture" when beddown and base recovery activities require participation from many specialties, most students participate in a multi-skill base recovery or a beddown exercise at the end of the training period.

6.6.3. During task evaluations, students must demonstrate they can successfully perform the major tasks listed for their specialty. Because Silver Flag is important to Air Force Civil Engineer readiness, successful completion of the training is reported by each Prime BEEF unit in its SORTS report.

6.6.4. Silver Flag activities depend on adequate home station preparation. Those requirements are detailed in a predeployment information package which the training cadre sends to each unit weeks before the unit deploys.

6.6.5. Silver Flag training is not intended to be a one time effort. The inability to practice many contingency tasks at home station drives the need for the core members of each Prime BEEF team to return to the Silver Flag site about every 2 years.

6.7. Special Training Programs. There are other training opportunities you should consider.

6.7.1. **Heavy Equipment Warskills Proficiency Training, PDS Code 9H7.** Regional Equipment Operator Training Sites (REOTS) operated by the Air Force Reserves at Dobbins AFB, Georgia and the Air National Guard at Ft. Indiantown Gap, Pennsylvania, provide an intensive week-long course to provide initial and refresher training to CE heavy equipment operators. The students train on four key rapid runway repair vehicles: excavator, 4CY front-end loader, grader, and dozer. The course is for active duty people as well as Guard and Reserve engineers. Each unit must pay student travel and per diem. Course details can be found in AFCAT 36-2223 in the section for HQ AFCESA courses. Request course quotas through your major command.

6.7.2. **AETC Specialized Courses.** AETC occasionally offers specialized courses which are tied to contingency training. Examples are the courses which cover bare base systems.

- Bare Base Power Generation Diesel Course
- Bare Base Electricians Course
- Bare Base Water Purification and Distribution Course
- Bare Base Structures Erection Course (This is a mobile course which is delivered to your door for just two course quotas. For that you can practically train your entire unit. This is very cost effective.
- Bare Base Staff Orientation Course (This is for officers and senior managers to get familiar with the systems.)

Quotas can be difficult to get for these courses. You compete for limited funding with other Air Force functional areas. Let your voice be heard when you request quotas from your major command. Just as with REOTS, course details are located in AFCAT 36-2223.

6.7.3**. USAFE and PACAF Courses.** HQ USAFE and HQ PACAF offer scaled down versions of the Silver Flag curriculum for in-place theater CE units. This training is presented by the 617 CES at Ramstein AB, Germany and by Det 1, HQ PACAF/CE Silver Flag Exercise Site at Kadena AB, Japan. The PACAF site sends a mobile training team to some of its bases to present selected contingency lessons. Each major command schedules its units.

6.8. Some Ideas About CE Contingency Training. Some random but useful ideas to help you develop your training program follow:

6.8.1. Pick your training emphasis each year. Decide what capabilities are most important for your unit. Make sure you can do those things well. Then work on eliminating your weak points. If you have a lot of them, decide which is most important and work it first.

6.8.2. Set training objectives for each lesson: what must be done, what skills are needed, who should be trained.

6.8.3. There are not enough people in the Readiness Flight to plan and conduct all required category 2 training. Use other people in the unit and select them early so they have time to develop their lessons. Consider dividing a Prime BEEF team into four to six groups. Put and officer and senior NCO in charge of each group for contingency training. At the beginning of the year, tell them what topics they need to cover and give them an annual schedule. They are to be totally responsible for planning and conducting the training for their group. They can use experts to help present some of the lessons. They should arrange their own logistical support. They can and should use the *Prime BEEF Courses of Study* or any other useful reference.

6.8.4. Good instructor preparation is essential. The best instructors are the ones you find who are excited about doing it. Ask the commander to occasionally visit a class for a short while. This gives a big boost to the instructor.

6.8.5. Train on the hard things also, not just the easy stuff.

6.8.6. Training should build on previous lessons.

6.8.7. Timing tasks and complex tasks need more training, more frequently.

6.8.8. Train by shop when you can and it makes sense to do so. This is more often possible when tasks are assigned to specific shops as discussed in chapter 5.

6.8.9. Performance, not talk is the measure of capability. Have people show you they can do the job. Periodically and randomly ask individuals in the unit to explain their job and their shop's job in a particular contingency. If they don't know, let the supervisor know he or she has a training job to do. If you see this frequently from one shop, then the supervisor is either not doing his or her job or he or she needs training.

6.8.10. For each task, make sure you have at least one expert on the team who knows how to do it.

6.8.11. Trainers should train their own replacements.

6.8.12. To get the most out of it, make sure your people do their homework before deploying to the Silver Flag exercise.

6.9. Summary. Training occurs on three levels: individual, unit, and integrated with other base units. Training should be realistic. An often heard statement remains an excellent training motto: "Train as you intend to fight." Getting enough time and resources for contingency training is a historical problem. When a threat is not imminent, training gets less emphasis. Yet, with a worldwide mobility commitment and peacetime disasters always possible, civil engineers must always be ready to respond. Often the biggest obstacle is within a CE unit. Answer two questions about your unit. How do our people view contingency training? Is it considered a chore or a challenge? If seen as detracting from the "real job", training is a chore for your unit. If people focus on why you cannot train due to shortages of equipment, time, and money, training is a chore. Good training is an attitude: you must work to overcome the obstacles. Training is not painless. You must carve out time from the work schedule. This is the commander's major input to readiness training, deciding how much time to allow for it. You can help the commander by outlining a good training program, getting everyone involved, setting training objectives, and developing an annual training schedule. We close with a quote by Lt General Arthur S. Collins, Jr., USA.

> "...Training is hard work, but it does not have to be dull. Much of military training is presented in boring fashion. The troops lose interest and do not absorb the instruction, the training program fails, and the morale of the troops drops. Good training requires a lot of mental effort; the commander must devise ways to make training intellectually and physically challenging to the troops. The unfortunate thing is that so many commanders don't recognize dull training. But their troops do."

CHAPTER 7

EXERCISES, EVALUATIONS, AND INSPECTIONS

"The man who is prepared has his battle half fought."
Miguel de Cervantes, *Don Quixote*, 1615

7.1. Introduction. Exercises, evaluations, and inspections--though not often popular--are an important part of readiness and contingency response preparations. Exercises provide civil engineers with valuable opportunities to practice base-wide contingency responses and train our people. Exercises enhance readiness, improve crisis response, boost combat capability, streamline procedures, and help units master OPLAN taskings. Evaluations and inspections provide important feedback to units and commanders on the adequacy of contingency planning, preparations, and training. The challenge is to intelligently use exercises, evaluations, and inspections to enhance CE capabilities.

7.2. Overview. This chapter outlines civil engineer involvement in exercises. It highlights the local exercises engineers participate in and offers suggestions on planning your activities. The chapter briefly discusses the joint service and major command exercises which civil engineer teams occasionally support. The chapter closes with a discussion on local exercise evaluations and offers tips for preparing for inspections. While this chapter focuses on base civil engineer organizations and mobile Prime BEEF units, RED HORSE units are major exercise players.

7.3. Civil Engineer Involvement. Civil engineers are routinely involved in exercises. Usually they are local exercises, but some engineers also have opportunities to participate in major command and joint service exercises. The degree of involvement depends upon exercise objectives and scenarios. In local exercises, you can usually dictate your level of effort by choosing to be major players in exercise planning. The more CE is involved, the better the unit will be prepared to respond to crises. Unit attitude is important. A CE unit gains the greatest benefit when its people enthusiastically participate in all aspects of an exercise, from planning to final critique. It is no coincidence, that in the best units, the CE commander is actively involved in the exercises, evaluations, and inspections. Where CE people look upon these activities as hindrances to their "real" job, there is a problem. These activities also get a bad name when your people are under-involved and have a lot of "sit-around" time. They get bored. You can improve attitudes by helping to create good local exercises. Since only a limited number of civil engineers have the opportunity to participate in a joint service or major command exercise, unit leaders must push for realistic local exercises with maximum civil engineer involvement.

7.4. Local Exercises. Local exercises provide good opportunities for training and evaluation. They are conducted more frequently than major off-base exercises, and you have more control over them. AFI 32-4001, *Disaster Preparedness Planning and Operations* directs a minimum number of exercises of various types be conducted. Functional publications provide additional exercise requirements. Some exercise requirements which affect civil engineers are:

7.4.1. **Attack Response Exercise.** This exercise involves base response to an enemy attack which is consistent with the threat to the base. The minimum frequency varies from one to two times per year. Civil engineer involvement can vary from a limited shelter exercise in the United States to a complex exercise which tests every facet of civil engineer survival and recovery capabilities. Overseas bases tend to exercise more frequently, as do all bases getting ready for an operational readiness inspection. Scenarios should contain events for nuclear, biological, and chemical attacks in addition to conventional attacks.

7.4.2. **Major Accident Response Exercise (MARE).** MAREs are conducted at least quarterly, with different accident responses tested each quarter. The different scenarios exercised include: a HAZMAT spill, a conventional munitions accident, a nuclear weapon accident, and a mass casualty. One MARE must be conducted off-base every 12 months, which requires coordination with local off-base authorities and prior MAJCOM approval. You must also have one MARE during non-duty hours every 12 months. AFI 32-4001 and AFI 32-4002, *Hazardous Material Emergency Planning and Response Compliance* outline other requirements. If the base has a HAZMAT team, it should be exercised at least annually.

7.4.3. **Natural Disaster Response Exercise (or review).** If your major command has identified your installation as being subject to catastrophic natural disasters, you must conduct exercises of the type specified. Other installations may conduct reviews.

7.4.4. **Mobility Exercise.** Separate exercises are conducted for units with mobility commitments. These exercises are needed periodically to ensure the units can assemble, equip, process, and load people and equipment and move them to a deployment location. This exercise often gets a lot of emphasis at CONUS bases.

7.5. Planning the Exercise (the CE portion). The Readiness Flight people and CE exercise evaluation team (EET) members must work with the local EET chief to plan civil engineer exercise involvement. You should push for realistic scenarios with minimum simulation. The more realistic an exercise, the greater is its value as an evaluation and training tool. Be sure to get your unit commander's input as to what he or she wants to test. Be ready to offer suggestions on what capabilities most need improvement and what areas could benefit most from being exercised.

7.5.1. **Set Your Objectives.** When planning CE inputs, first determine or set your objectives for the exercise. The particular crisis or threat will dictate the basic thrust of the exercise. You should also consider MAJCOM special interest items, Inspector General (IG) findings from other units, and deficiencies noted from previous exercises when setting exercise objectives. The common-core criteria detailed in AFI 90-201, *Inspector General Activities* should never be overlooked. General information is also contained in AFI 10-204, *Participation in the Military Exercise Program*. Obviously the scenarios should test your response capabilities and evaluate your response planning. Scenarios should also permit identification of limiting factors (LIMFAC) and evaluation of:

- Recall procedures
- Command and control

- Crisis management. The ability to respond to the situation (recovery actions).
- Predisaster actions.
- Security (OPSEC and COMSEC).
- Mobility processing.
- Postdisaster recovery.

7.5.2. **Requirements Vary.** Exercise requirements vary with unit location and mission.

7.5.2.1. **CONUS Bases.** CONUS forces must be capable of responding to peacetime disasters and emergencies. During wartime, they must also be capable of maintaining essential base functions. For wartime simulations, exercise planners should assume that mobile Prime BEEF teams are deployed and that remaining forces and resources must sustain essential base functions. CONUS units should exercise the civil engineer contingency response capability at least once each year using only the non-mobile force. One possibility is to conduct a recovery exercise while the Prime BEEF mobile teams receive their annual bivouac training. The need to pay civilian overtime and to consider work conditions negotiated with a civil service union may limit some of your options to have civilian employees participate in these exercises.

7.5.2.2. **Overseas Bases.** In-place forces should also exercise and be evaluated in peacetime disaster responses as well as the traditional wartime tasks: disaster preparedness operations; rapid runway repair; explosive ordnance disposal; utility and facility operations and maintenance; emergency repair of utilities and facilities; crash rescue and fire suppression; debris removal; base denial; and other personnel support. Some exercises should be held without the benefit of locally hired civilian employees. You should become familiar with Status of Forces Agreement (SOFA) and other rules governing local civilian labor participation in exercises.

7.5.2.3. **Mobile Prime BEEF Teams.** During wartime, civil engineers must be able to provide base and facility support to satisfy mission requirements worldwide. These operations may be conducted in a wide range of locations including main, collocated, limited, standby, and bare bases. Prime BEEF people will normally be used to form a base civil engineer unit or augment an existing civil engineer unit. Civil engineer support requirements for specific theater bases are normally documented in Base Support or Joint Support Plans. When available, such information should be used to enhance the exercises and evaluate the readiness capability of Prime BEEF mobility forces. The areas in which Prime BEEF mobility forces should be evaluated are mobility and deployment planning and execution, employment, and redeployment.

7.5.3. **Some Hints.** Consider the following thoughts when planning civil engineer involvement in exercises:

- Avoid the stereotyped or "canned" exercise. No two exercises should be the same. Vary the location. When exercising recovery response, incorporate different problems and different types of buildings and utility systems.
- Be thorough when planning and designing scenarios. Try to include as many shops as is reasonable in the exercise.
- Build exercises as close to real world as possible. Add details which help create the stress and pressure that would be experienced in the real situation. For example, provide a lot of damage input to the CMC (SRC or CSS) and CE control center from many sources over a short period of time. Handling a lot of both useful and extraneous information stresses those control centers, but it also gives them needed practice in sorting out what situations deserve priority attention.
- Exercise when it is not convenient. Exercise under unique conditions. It may be a routine task to conduct a recovery exercise under normal circumstances; try it during non-duty hours with the phones out of commission or under radio-silence.
- If civilian employees are to participate in exercises during non-duty hours, you must be prepared to pay overtime.
- Be creative. You can have a lot of fun setting up good exercises, and create interest for your unit.

7.5.4. **For the Risk Takers.** If you feel real adventurous, try to get your base to exercise as one base did--operate for 5 days without commercial power, using only back up or standby generators. To add even more realism, the exercise was conducted while mobile Prime BEEF teams were deployed. Such an exercise has tremendous impact on the entire base. This is not an easy concept to sell to an installation commander. Such an exercise does not have to last much more than a day to gain major benefits, but it is best done as part of a larger base exercise with all units participating. Everyone then learns their true dependence on CE-provided power. They get a realistic opportunity to identify their wartime limitations and develop work-arounds. The same applies to civil engineers. This type exercise conveys realism and encourages enthusiastic participation by all civil engineers. You risk an immediate demand from every unit for emergency generators which you cannot reasonably hope to satisfy. Because of the impact, the installation commander will need to inform the major command in advance.

7.6. Higher Headquarters Exercises. Civil engineers occasionally have the opportunity to participate in larger scale major command and joint service exercises. These exercises offer a great chance to hone contingency skills, both during the exercise and on exercise related construction. For these exercises, Prime BEEF and RED HORSE teams will not likely be involved in the exercise planning. That planning will be done by the joint or major command engineers. CE teams often arrive first to beddown the exercise participants and leave last after "striking camp". Exercises offer an opportunity to test the ability of mobile forces to meet time sensitive requirements. While these exercises usually last a week or more, they expose civil engineers to tasks and equipment CE people do not get to use very often. Harvest Eagle and Harvest Falcon equipment is frequently used and expedient methods are often required. This provides the important benefit of offering Prime BEEF and RED HORSE personnel the unique opportunity for additional "hands-on" training with this equipment under simulated wartime conditions. The following paragraphs provide examples of major exercises civil engineers support.

7.6.1. **Exercise Team Spirit.** This exercise tests the ability of the US military to reinforce its forces in the Republic of Korea in combined operations with South Korean forces. Prime BEEF and RED HORSE personnel are deployed to augment in-place civil engineer units to provide force beddown, operations and maintenance support, and base recovery capabilities.

7.6.2. **Exercise Bright Star.** This joint service exercise is conducted in Southwest Asia to evaluate USCENTCOM capabilities. Some CE people are deployed to provide force beddown and base operations and maintenance.

7.6.3. **Exercise Brim Frost.** This joint service exercise is conducted in Alaska. The vast majority of Air Force civil engineer support for it comes from people assigned to units in Alaska. However, support from the "lower 48" CE forces is encouraged. This exercise presents an excellent opportunity to practice contingency skills in a cold environment.

7.6.4. **Exercise Fuertas Carminas.** This exercise has a humanitarian and civic action focus versus the operational employment focus of the other exercises. It occurs in Central America several times during the year, and provides engineers with an excellent opportunity to use and learn expedient construction methods.

7.6.5. **MAJCOM Exercises.** Many exercises are planned and conducted each year by individual MAJCOMs such as ACC, PACAF, USAFE, and AMC. Seldom are units from other than the sponsoring MAJCOM involved.

7.6.6. **A Bonus for Your Base.** Hosting a major exercise on your base can be a headache, but you can gain some benefits. For example, exercise funds can be used to construct exercise facilities which you can later use for local exercises. The construction provides valuable practice for CE teams. Your major command or the joint command provides the exercise construction requirements, but you can certainly identify your needs and try to develop mutually satisfying solutions.

7.7. Evaluations. An earlier paragraph mentioned the need to set exercise objectives. How do you know you met those objectives? Each base has an exercise evaluation team to answer that question. The installation commander appoints the EET chief. Each unit commander designates individuals to serve on the team to evaluate their own functional area. The evaluators need to be experts in their field and well-trained. They must avoid the temptation to nit-pick. Exercises should not be an "us against them" event for the EET members. The evaluator's role is to help the unit expose the big problems in an exercise and identify their causes. EET members should also be alert to give credit when good things are done.

7.7.1. In conjunction with the Readiness Flight, the CE evaluators should develop checklists to aid in their evaluations. A good place to start is with AFI 90-201. It provides common-core evaluation criteria for Prime BEEF, mobility, environmental, OPSEC, SORTs, and self-defense of deployed units. (The self-defense applies to RED HORSE.) The common-core criteria outline the baseline tasks to be measured, desired combat readiness status, and rating criteria to be used by Operational Readiness Inspection (ORI) teams. The common-core criteria emphasize performance versus compliance. They are a valuable tool when evaluating civil engineer planning and execution during contingency and disaster response exercises. Do not forget the guidance contained in your major command supplements to AFI 90-201. As with exercises, checklists should not be static. The first checklists will not be perfect. As EET members learn more, encourage them to update their checklists.

7.7.2. Good evaluations are worthless if you do not make sure that the identified problems are corrected. In after-exercise critiques, designate who is to fix what problems. Give them a target date they can live with, and make sure everyone understands they are to fix the problem. No pencil whipping. On that point, do not force the shops to prepare a lot of paperwork telling you what they have done to correct the problem. While you probably cannot avoid it entirely, eliminate the paper flow when possible. Let the shops use that time to correct the problems. Then follow up, either personally or by someone you trust. Make sure corrections are completed. Eliminate recurring deficiencies. You do not want repeats, especially during inspections and assessments.

7.8. Inspections and Assessments. A lot can be said about inspections, but not here. While major command operational readiness inspections and quality Air Force assessments cause great anxiety and are not enjoyable, you can use them to improve your readiness and contingency response program. Anticipate what the inspectors will ask you to do. Look at previous inspection reports for your unit and recent reports for other units. Make sure you can do the common-core tasks. Call your counterparts at units just inspected and get their personal perspective. When you prepare for the challenges of the inspectors, you in fact improve your unit response capabilities. Inspections are also a chance to shine. Commanders remember those people and units which do well.

7.9. Summary. Training and exercising as a unit produces unit cohesion and combat capability. Training alongside other functional and operational specialties develops integrated combat support. Exercises are important tools to measure the effectiveness of civil engineer contingency planning and preparations. Joint service exercises expose Prime BEEF teams to major contingency tasks under actual deployed (field) conditions. Unfortunately, few teams get to go, and those exercises do nothing for peacetime disaster responses. A major command ORI measures a unit's capability to accomplish its wartime tasks, but these inspections are not frequent enough to give commanders a steady flow of readiness information. Local exercises remain the best way to give commanders adequate force readiness information and provide personnel with realistic training. Use creativity, imagination, and realism when planning and conducting any exercise. Truly fix problems and deficiencies identified during exercises, evaluations, and inspections.

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The Civil Engineer

GLOSSARY OF REFERENCES, ABBREVIATIONS, AND ACRONYMS

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Acronyms

AFB	Air Force Base
AFFF	Aqueous Film Forming Foam
AFRES	Air Force Reserve
AFS	Air Force Specialty
ANG	Air National Guard
ANGUS	Air National Guard of the United States
AS	Allowance Standard
BCE	Base Civil Engineer
BPA	Blanket Purchase Agreement
BRAAT	Base Recovery After Attack
BSP	Base Support Plan
CCA	Contamination Control Area
CCD	Camouflage, Concealment, and Deception
CDC	Career Development Course
CD-ROM	Compact Disk - Read Only Memory
CE	Civil Engineer
CES	Civil Engineer Squadron
CESP	Civil Engineer Support Plan
CFETP	Career Field Education and Training Plan
CMC	Contingency Management Center
COB	Collocated Operating Base
COCESS	Contractor Operated Civil Engineer Supply Store
COMSEC	Communications Security
CONUS	Continental United States
CPX	Command Post Exercise
CRP	Contingency Response Plan
CSS	Contingency Support Staff
CUP	Core UTC Package
CWD	Chemical Warfare Defense

DART	Damage Assessment and Response Team
DAT	Damage Assessment Team
DCC	Damage Control Center
DOD	Department of Defense
DRF	Disaster Response Force
DRMO	Defense Reutilization Marketing Office
EALS	Emergency Airfield Lighting System
EAP	Emergency Action Procedures
EET	Exercise Evaluation Team
EOD	Explosive Ordnance Disposal
ESL	Equipment and Supplies Listing
FEMA	Federal Emergency Management Agency
FLIP	Flight Information Pamphlet
FOD	Foreign Object Damage
GP	General Purpose
HAZMAT	Hazardous Material
HE	Harvest Eagle
HF	Harvest Falcon
HNS	Host Nation Support
HTSA	Host Tenant Support Agreement
IG	Inspector General
IMA	Individual Mobilization Augmentee
ISSA	Interservice Support Agreement
JSP	Joint Support Plan
LIMFAC	Limiting Factor
MAAS	Mobile Aircraft Arresting System
MAJCOM	Major Command
MARE	Major Accident Response Exercise
MOS	Minimum Operating Strip
NAF	Numbered Air Force
NBC	Nuclear, Biological, and Chemical
O&M	Operation and Maintenance
OMC	Operations Management Center
OPLAN	Operation Plan
OPM	Office of Personnel Management
OPR	Office of Primary Responsibility
OPSEC	Operations Security
ORI	Operational Readiness Inspection
OSCG	On-Scene Control Group
O-WRM	Other War Reserve Materiel
PACAF	Pacific Air Force
PD	Position Description
POL	Petroleum, Oils, and Lubricants

POS	Peacetime Operating Stocks
Prime BEEF	Prime Base Engineer Emergency Force
PWRMS	Prepositioned War Readiness Materials
RED HORSE	Rapid Engineer Deployable Heavy Operational Repair Squadron, Engineer
REOTS	Regional Equipment Operator Training Site
RQC	Repair Quality Criteria
RRR	Rapid Runway Repair
RTP	Readiness Training Package
SABER	Simplified Acquisition Base Engineer Requirements
SOFA	Status of Forces Agreement
SORTS	Status of Resources and Training System
SRC	Survival Recovery Center
SRR	Survival, Reconstitution, and Recovery
STS	Specialty Task Standard
SWA	Southwest Asia
TDY	Temporary Duty
TDO	Tactical Deception Officer
TPFDD	Time Phased Force and Deployment Data
TPFDL	Time Phased Force and Deployment List
US	United States
USAF	United States Air Force
USAFE	United States Air Forces in Europe
USAFR	United States Air Force Reserve
UTC	Unit Type Code
UXO	Unexploded Ordnance
VAL	Vehicle Authorization List
VCR	Video Cassette Recorder
WHNS	Wartime Host Nation Support
WMP	War and Mobilization Plan
WOC	Wing Operations Center
WRM	War Reserve Materiel
WWMCCS	Worldwide Military Command and Control System

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GUIDELINES FOR PREPARING CIVIL ENGINEER CONTINGENCY RESPONSE PLANS

A3.1. General Guidance. AFMAN 10-401, *Operation Plan and Concept Plan Development and Implementation* is the bible for operation plan (OPLAN) preparation. The AFMAN permits considerable latitude in format for plans other than major command OPLANs and concept plans (CONPLAN) which are written in support of joint service plans. The Civil Engineer Contingency Response Plan follows the basic format but varies to satisfy specific CE needs and to better support the Base Disaster Preparedness OPLAN 32-1. The format also makes it easy to add annexes or appendixes to support other plan taskings. The Contingency Response Plan does not replace CE input to other plans. Rather, it provides a convenient place to expand upon those inputs and provide detailed CE-specific response instructions. Table 3.5 in chapter 3 lists plans CE often supports. Figure 3.1 shows where details to support those plans can be incorporated into the Contingency Response Plan. Some of those details are included in the examples in this attachment.

A3.1.1. The Contingency Response Plan contains a lot of information in one convenient place to help civil engineers make quick and sound decisions in contingency situations. The large volume of information dictates that it be well organized so you can find needed information quickly. The ideal organizational arrangement puts the most important information you need at your finger tips. The suggested format in this attachment enables you to organize your plan in modules and place them in binders, so CE people at all levels of the organization can easily "grab the book" they need for each particular situation. The "book" for each shop, team, or control center position need not have a complete CRP, but it should contain execution checklists (derived from the plan's operating instructions); a copy of the applicable operating instructions; any needed maps and schematics; communication procedures, etc.

A3.1.2. Except for the annex letters and titles which are specified in AFI 10-211, *Civil Engineer Contingency Response Planning*, the formats in this attachment are guides only. If you have a more useful format for your base, use it and share it with others. If you want to send your ideas to HQ AFCESA, please indicate that you are submitting them for consideration in the next update to this pamphlet.

A3.1.3. The Contingency Response Plan should help the CE unit respond to crises. Consequently, it must contain response procedures and useful supporting information. It is very easy to include so much information that the plan becomes "user unfriendly". Avoid this by starting out with a clear idea of what you want to include and what level of detail. Always review the plan in progress to make sure you keep to your game plan. You do not need a plan that covers every conceivable situation. You have a good plan if, for major situations, it clearly outlines: who is to respond; what resources they are to take; where are they to get the resources including any special access requirements; where are they to go first; what initial tasks they are to do; who is in charge; how they are to communicate with their boss, and how will they be resupplied.

A3.1.4. When a Contingency Response Plan is well researched and prepared, it will require few changes over the years, basically only tweaks to change names and equipment status. If your plan has many weaknesses, you do not have to fix all of them at one time. Pick one annex or appendix and do a proper job with it. Once you have completed one of the first three annexes (A, B, or C) as you want it, the remaining ones will be significantly easier.

A3.1.5. There are many ways to format a plan. Be consistent so far as it is possible, practical, and logical. Try to place the same type information in the same relative place and use similar titles throughout the different appendixes or tabs. For example, you might choose to place communication procedures last in all appendixes or tabs. Such consistency makes the plan easier to use.

A3.2. Plan Components. AFMAN 10-401 specifies eight components to an OPLAN: a cover; a letter of transmittal; security instructions and record of changes; a plan summary; classification guidance; a table of contents; the basic plan; and annexes, appendixes, tabs, etc. You can include all of these components in your Contingency Response Plan, but only three are generally necessary for the CRP: the table of contents, the basic plan, and the annexes with their appendixes and tabs. These elements are discussed in this attachment. If your plan contains classified information, the plan must be marked according to the AFMAN 10-401 instructions, and you must add the security instructions component. Refer to AFMAN 10-401 for guidance on the other components. A cover is optional, but it does add a finishing touch to a plan. Figure A3.1 shows a sample cover.

A3.3. Table of Contents. Figure A3.2 presents a sample format for a table of contents. Suggest you develop a draft or working table of contents early in your plan preparation process. It serves as a useful plan preparation guide, and it also makes the job easier for others to assist in plan development.

A3.4. Basic Plan. Format and guidance for the basic plan is included in figure A3.3. This sample is written as an unclassified plan. Recommend you write your plan so it is unclassified. If you need to cover classified material, incorporate that material into a classified annex printed and bound separately from the basic document.

A3.5. Annexes, Appendixes, and Tabs. There is no required format or content for annexes, appendixes, or tabs. The following paragraphs offer some format and content suggestions. Figure A3.2 also highlights one way you can organize the appendixes and tabs for your annexes. The list of appendixes and tabs in figure A3.2 is not intended to be comprehensive. Tailor them to your need. Add, drop, or consolidate appendixes to cover the situations your base may experience. Create tabs (operating instructions) to guide the response of each team you organize for each situation. Tables 3.1 through 3.4 in chapter 3 may trigger ideas for other appendixes and tabs. Use as few or as many appendixes and tabs as you need. If you do not need an annex, you should still list it in the table of contents with its corresponding letter, but mark it "Not Used". Annexes T, U, V, and W can be used and locally defined if you need to include information which does not fit well into the other annexes. The letters "I" and "O" are generally not used as labels for annexes or tabs to avoid confusion with the numbers one and zero.

A3.6. Annex A--Major Peacetime Accident. The recommended format for this annex is the same as the basic plan, but this annex should provide more detail on major accident responses (figure A3.4). The emphasis in the basic annex should be on the conditions which trigger a response, the major CE taskings, and the command relationships. The appendixes and tabs provide the specific details for the CE response teams. Likely accidents are covered in separate appendixes. The tabs to each appendix contain operating instructions for control centers and for each flight, shop, or team which must respond, either initially or in a support role. General information for the basic annex can be extracted from annex A of the Base OPLAN 32-1, especially from the CE appendixes. Rather than duplicate that information in two plans, you may choose to write it in one and cross-reference it in the other. If you extract information from the Base OPLAN 32-1 (or any other plan) and it is rewritten often, you may be forced to update the Contingency Response Plan just as often.

A3.6.1. **Appendixes to Annex A.** Prepare an appendix for each major accident likely to occur on or near your installation. Accidents which call for the same initial response across the organization can be consolidated into one appendix. While accident situations vary, the initial response will generally be similar. You will need at least three appendixes: one for on-base accidents, one for off-base responses, and one for hazardous material (HAZMAT) spills. Accidents involving nuclear materials may trigger the need for another appendix. Follow your Base OPLAN 32-1 direction. See figure A3.5 for the suggested format.

A3.6.2. **Tabs to Appendixes in Annex A.** Create tabs to provide specific instructions for the response of each flight, shop, team, and control center. Recommend tabs be formatted as operating instructions as in figure A3.6. CE control centers, flights, shops, and teams should develop execution checklists from their operating instructions (tabs). Checklists are not part of the plan.

A3.6.3. **Common Appendixes and Tabs.** When guidance applies to all teams, a common appendix or tab can be written. A common tab is useful when there is a large amount of identical information and you do not want to duplicate it in all tabs. Unit recall and assembly procedures and communication procedures are two examples. Figures A3.7 and A3.8 provide format ideas for these two common activities. Special notification and communication requirements should still be included in individual appendixes and tabs. If you choose to use common appendixes and tabs, recommend you use that format throughout the plan.

A3.7. Annex B--Natural Disaster. Tailor the basic formats in figures A3.4 through A3.8 to present the information required in this annex and its appendixes and tabs. Write an appendix for each "likely" natural disaster such as hurricane, tornado, wild fire, flood, etc. Where responses differ from those of an accident, write different operating instructions for each appendix. When responses are essentially the same, you can just refer to a previous tab. Be sure to cover CE predisaster, dispersal, and evacuation actions. Also address CE actions to provide temporary shelter for disaster victims. See figure A3.2 for ideas about appendixes for this annex.

A3.8. Annex C--Enemy Attack. The instructions for annex B also apply to this annex, except the appendixes will reflect wartime activities. Because terrorism is a constant threat, it too should be covered in an appendix. Figure A3.2 offers ideas on other appendixes and tabs for this annex. Content suggestions for some of the appendixes follow:

A3.8.1**. Appendix #--Notification, Recall, and Assembly.** Outline procedures used to notify the unit of its need to respond. Describe instructions and assign responsibility to initiate unit recall. Cover individual responsibilities when notified to return to duty: recall responsibilities, what personal gear to bring, when and where to report, etc. Include notification, recall, and assembly instructions for each type of response. When the instructions apply to more than one situation, cross-reference rather than repeat the same instructions.

A3.8.2. **Appendix #--Base Reception Plan Support.** Present the CE tasks and detailed instructions to beddown the forces which will augment the base or to accommodate the forces which will flow-through it in war. Also cover all CE support to temporarily shelter non-combatant evacuees. Outline what is to be done in priority order and by who. Include a schedule showing when tasks must be completed.

A3.8.3. **Appendix #--Expedient Hardening.** Provide instructions for the expedient hardening tasks which CE must perform and for required support to other units engaged in hardening their own facilities and equipment. List the facilities involved. Indicate what is to be done, by whom, and when.

A3.8.4. **Appendix #--Camouflage, Concealment, and Deception.** CCD is a base effort. This appendix covers CE tasks and CE support for other units, such as the Tactical Deception Officer. There are many time sensitive tasks. List each task, team responsible, and required completion date. Classified information can be included in annex X.

A3.8.5. **Appendix #--Resource Dispersal.** Identify resources to be dispersed, how they will be moved, who will do it, where they will go, and when. Also identify any site preparation required for the locations where teams disperse as well as equipment and materials they should take to prepare those sites. Include classified information in annex X.

A3.8.6. **Appendix #--Non-Combatant Evacuation.** If not included, in the Base Reception Plan Support appendix, then be sure to include CE support in some appendix. Since this is a base wide effort, show CE interface and timing.

A3.8.7. **Appendix #--Casualty Care.** Following base procedures, explain what the unit and individual members are to do with casualties--both the wounded and the dead. You may not be able to include some details, such as locations of casualty collection points, because that information may not be available until just before hostilities begin or after an attack. The fact that casualties should be taken to those locations can be noted in this appendix as well as requirements to notify team chiefs or supervisors.

A3.8.8. **Appendix #--Base Recovery After Attack Actions.** While the type, intensity, extent, and duration of an attack cannot be known, this appendix and its tabs can provide the details for the initial CE response to a base attack. The details between an overseas and a CONUS base will naturally be considerably different. This example in Figure A3.2 outlines the situation at an overseas base.

A3.8.9. **Appendix #--Vehicle and Limited Area Contamination Control.** Show how vehicles and limited areas (mission essential equipment, and command post entry points) can be decontaminated during peacetime chemical accidents or wartime NBC operations. Include a list of vehicles, equipment, and personnel used in decontamination operations.

A3.8.10. **Appendix #--Survival, Reconstitution, and Recovery.** If your base has an SRR tasking, include CE support actions in an appendix. As with all responses, identify what is to be done, by whom, with what resources, by when, and where.

A3.8.11. **Appendix #--Security and Base Defense.** Show how CE personnel designated to bear arms are to be used during contingencies and wartime operations. This requires direction from your security police. If they do not plan to use CE people, state that. Plans must contain provisions for command and control with emphasis on fire control. Include an indication of when CE people might be called on to help. A specific DEFCON or THREATCON? A specific situation? Usually this will be included only at overseas bases.

A3.8.12. **Appendix #--Weapons and Ammunition Management.** Civil engineer forces assigned or subject to performing recovery operations in a hostile environment should be armed, weapons-trained, and qualified to bear arms. In general, the management of weapons assigned to any civil engineer organization is a shared responsibility between the commander, the readiness flight chief, a deploying Prime BEEF team chief, and the individuals receiving the weapons. This appendix must address the management of the weapons authorized for use by Air Force engineers. Rather than a separate appendix, this information can be included as a tab (operating instruction) in the security and base defense appendix. Instructions relating to deployment preparations can be included in annex F.

A3.8.12.1. Address the accountability and maintenance of all weapons assigned to the organization. The intent is to ensure that weapons and ammunition are controlled and that security procedures are followed when weapons are in storage or when they are issued to individuals. Stipulate the security procedures to be followed when weapons are issued to ensure that positive control is maintained at all times.

A3.8.12.2. Address storage of weapons and ammunition in garrisons and under field conditions. The instructions should spell out procedures that will be used to protect the firearms as well as the method of sounding an alarm if a forceful theft is attempted. An armed response force must be reasonably available to protect the weapons.

A3.8.12.3. Also address the movement of weapons. This includes the preparation, storage, marshalling, issue, courier, and safeguarding of small arms and ammunition deployed in support of contingency operations.

A3.8.13. **Appendix #--Base Denial.** CONUS bases do not require this annex. Engineers are well qualified to execute denial operations with heavy equipment and demolitions, but other units must also be involved in denying their facilities and equipment. This annex must provide detailed instructions for carrying out CE denial tasks. Theater commanders establish the policies governing denial operations in the theater, and delegate base-specific denial planning and execution to the lower level of command. As a minimum:

- State conditions for base denial, when possible.
- List the commanders having local denial authority.
- List specific facilities, utilities, equipment, and supplies to be denied. Indicate the method and degree of denial. Assign those "targets" to specific denial crews for execution. Identify discretionary "targets" and the conditions in which they would be denied. Also identify any prohibited "targets": those are facilities which must not be damaged. Most often such facilities have historical or cultural significance. Evacuation of equipment and materials is as much a part of denial operations as destruction and should always be considered first.
- List the priority for destruction or evacuation. Delineate the time phasing of denial. The amount of time available can affect the order in which items are denied. With little time, the higher priority facilities will likely be denied first. With additional time and an uncertain situation, the higher priority facilities may be saved until the last.
- For evacuation, specify what items will be moved, on what vehicles, and by whom.
- Describe availability of special civil engineer denial teams (such as RED HORSE demolition teams).
- Outline limitations on destructive denial.
- Describe safety and security measures to be followed.
- Describe how denial resources, from both on-base and off-base sources, will be allocated.
- Include instructions for removal or destruction of classified materials and documents.

When selecting facilities and equipment for denial, planners must consider national policy restrictions, if any, of the US or host nation. Coordinate as required with other functional areas, US elements, joint commands, and allied forces. Generally, these considerations should be covered in the installation denial plan.

A3.8.14. **Appendix #--Minimum Alert Preparations.** There will always be a need to outline the most important actions to get ready for war with minimum notice. Recommend you include minimum alert preparations in each individual annex, appendix, and tab. You may also choose to consolidate them in one appendix or include them in annex X, if classified. Because of the time sensitivity, be sure to: list the tasks in priority order; identify who will do them; state what resources will be available and priorities for use of equipment; and specify when they should be completed.

A3.8.15. **Appendix #--Facility Operations and Maintenance with Limited Manpower.** Tell what facility operations and maintenance tasks will be performed when not all members of the CE unit are available. This includes operation of utility and HVAC systems. Two scenarios come to mind: Prime BEEF teams have deployed or the civilian workforce is unavailable for any reason at bases in foreign countries. Cover each scenario as appropriate to your base.

A3.8.16. **Appendix #--Operations Security (OPSEC).** Civil engineers must always be sensitive to operations security. Describe procedures to minimize transmission by non-secure radios, phones, computers, messages, etc. of information on base status and unit capabilities. The status of most of the tasks covered in this annex are OPSEC sensitive.

A3.8.17**. Appendix #--Communication Procedures.** If not covered elsewhere, include a communications appendix. Be sure to cover the allocation of equipment, communication procedures and priorities, call signs, authentication codes, etc. Classified information should be included in annex X.

A3.9. Annex D--CE Support for Miscellaneous Plans/Situations. This annex permits the plan to include CE support for plans and situations which are peculiar to a base or which do not logically fit into annexes A, B, or C. Suggest you prepare an appendix with tabs for each of those plans or situations. Good examples include a bomb threat, the Stop Alert Plan, mortuary support, and the Installation Security Plan (or Resource Protection Plan). Joint Support Plans call for certain actions by overseas USAF support bases when the plans are implemented. If your unit has such taskings, include them in this annex. Provisions to protect real property records and engineering record drawings from damage can be included here or in annexes B and C to tie them to a specific crisis.

A3.10. Annex E--Firefighting and Rescue Operations. Describe firefighting, crash rescue, containment, and response actions to be taken during attack, natural disaster, major accidents, and major fire incidents (as prescribed by AFIs 32-2001, 32-4001, and 10-210), and local operations plans. Emphasis should be on the total unit response and on support for fire fighting operations. "Normal" emergency responses and firefighting operations need not be included if they are covered by pre-fire plans. Cover:

- Firefighting and crash rescue vehicles and quantities of fire suppression agents available on base.
- Emergency off-base responses including predesignated firefighting vehicles with their un-refueled on-road travel distances. Include logistics support requirements.
- Procedures to provide fire suppression services for nearby federal facilities if municipal employee strikes or slowdowns inhibit normal municipal fire suppression services.
- Conflagration hazards and natural cover fires.
- Alternate water sources.
- Vehicle resupply procedures (agent, water, fuel), procurement of additional firefighting agent supplies, and the availability of personnel from other than the fire protection organization.
- Specific responsibilities of other organizations to support firefighting operations, types of equipment available by support agencies, and response procedures. This includes auxiliary firefighting.
- Reciprocal agreements for fire protection entered into by the Air Force installation fire department with other fire organizations to ensure adequate manpower and equipment are available to cope with major fire incidents and disaster situations that exceed the capability of the Air Force installation fire department. The agreements should be summarized or the actual agreements included in annex M.
- Confined space search and rescue. Include procedures and support requirements for confined space search and rescue. Cover situations where the fire protection flight traditionally acts independently (such as rescues from a POL tank, an on-aircraft fuel cell, or a burning building) and situations which require an integrated effort by the disaster response force (such as a collapsed building rescue).

A3.11. Annex F--Deployment Preparations. Include appendixes and tabs, as needed, to define all actions required to prepare the Prime BEEF teams for deployment once they are alerted. Provide details for the CE tasks outlined in the base mobility plan. Assign responsibilities to specific crews and show when each task must be completed. Suggest you prepare operating instructions for mobilizing the teams; preparing, marshalling, and transporting equipment and weapons; and, if required, convoying the team to its port of embarkation. This annex should not duplicate information in the base mobility plan.

A3.12. Annex G--Contingency Environmental Considerations. Include instructions for environmental protection which are unique to contingencies or which are so important that they need to be emphasized. By way of example, contractors dispose of toxic wastes for most bases. In war, contract disposal may not be possible. You need to identify how you would temporarily store or permanently dispose of toxic materials when you cannot get access to an approved disposal location. If materials are to be buried, identify those sites in advance and determine what methods and materials you will use to control runoff and leaching into the ground. Non-standard pollution prevention and clean-up procedures should be addressed. Address procedures to protect on-base water supplies from HAZMAT spills and indirect runoff.

A3.13. Annex H--Facility Priority Listing. List the priority of installation facilities in their importance to the installation mission. The list indicates which facilities get priority attention for actions such as expedient hardening, firefighting, damage recovery, CCD, or utilities isolation (in reverse order). The list should be used as a guide, not a hard, fast plan, since unforeseen circumstances can easily dictate deviations. In those situations, common sense and good judgment must prevail. Figure A3.9 shows a sample format.

A3.14. Annex J--CE Personnel Shelters. Provide instructions for sheltering civil engineers before, during, and after disasters and war. List the personnel shelters which civil engineers will occupy or manage. Extract that information from the base shelter listing or incorporate that list in its entirety. For each CE shelter, include capacity; the kind of shelter (NBC, tornado, flood, etc.); who owns and operates it and who else uses it; how long it should be prepared for occupancy; what utilities it has (heat, power, backup power, communications, etc.); protection factor and date of last survey, if a nuclear shelter. Identify which part of the facility is to be used for shelter space if not the entire building. Include shelter preparation and operating instructions for CE shelter management teams. Provide shelter assignment instructions for CE shops/teams. If your major command has more specific guidance, follow that.

A3.15. Annex K--Personnel Augmentation. This annex covers where additional people--both skilled and unskilled--are to be obtained. This includes Prime BEEF teams, contractors, reserve backfills, base augmentees, etc.

A3.15.1. **Appendix #--Base Augmentees.** List augmentee requirements from the base READY program and highlight their duties and responsibilities and who in CE is responsible for each group..

A3.15.2. **Appendix #--Integration of Deployed Teams.** Provide instructions for integrating Prime BEEF and other teams which are deployed to assist you. Identify facilities, space, vehicles, equipment, and communications equipment which will be provided to those teams. Outline the command and control arrangements and likely tasks the teams will complete. Suggest you include an outline of the in-brief or written information your unit should present to the arriving team and its commander/chief. Provide a situation brief, the information contained in this appendix, administrative and logistics support procedures, natural hazards in the area, and special safety concerns.

A3.15.3. **Appendix #--Civilian Contractor Capability and Unskilled Labor in the Area.** Include the following information in this appendix:

- Available contractors by name, address, phone number, point of contact, and specialties.
- Contact points for obtaining unskilled laborers.
- Any restraints that would preclude using local civilians.

A3.15.4**. Appendix #--CONUS Sustainment Backfill Requirements.** At some CONUS bases, reserve personnel backfill deployed Prime BEEF positions and provide essential facility operation and maintenance during war. List those requirements and plan to efficiently receive and employ backfill personnel.

A3.15.5. **Appendix #--Availability of Other Military Forces.** List US military engineer forces (especially reserve and guard units) on or near the base that could rapidly backfill essential positions. Include the name, phone number, and address of the point of contact. These units have their own wartime taskings, so they may only be available in peacetime.

A3.16. Annex L--Equipment and Supplies. This annex provides a summary of required and on-hand civil engineer equipment, vehicles, and supplies. It outlines possible sources for those items if not on-hand.

A3.16.1. **Appendix #--Equipment Under Direct Air Force Control.** Include this information:

- General purpose, construction, and debris cleanup vehicles and support equipment required for contingency operations. List by type and quantity available. If the equipment is not under CE control, note its location along with the contact point for authorizing CE use.
- Equipment and vehicle dispersal procedures if not already included in annex C. For peacetime dispersal at all bases and wartime dispersal at CONUS bases, include site location, vehicle restrictions, dispersal notification, support available at the site, etc. Kits enabling contingency response crews to survive and operate at each dispersed site should be identified in this appendix. Give copies of the OIs to each team leader involved, and place one copy in annex L.
- Handwritten changes can be made to the copies of the plans in the SRC, CE control center/DCC, and the master plan in lieu of retyping and reprinting and distributing a new appendix.
- The suggested format follows:

Requirement (type/number)	Quantity Available	Source	Location	Type Agreement	Point of Contact

A3.16.2. **Appendix #--Equipment That May Be Obtained from Nearby Civilian or Military Sources or Other State and Federal Agencies.** Sources, types of agreement, types of vehicles/equipment available, and points of contact (including name, address, and phone number) should be listed. If mutual aid agreements have been made, include a copy of the document in annex M. Use the format in paragraph A3.16.1. To speed the paperwork, include sample AF Form 9s completed except for the quantity of an item needed. Identify the fund citation to include on the Form 9.

A3.16.3. **Appendix #--Construction Material Stockpiles.** List construction materials stockpiled or prestocked by type and quantity. Contact points for release should be noted if the materials are not under direct BCE control. Use or modify the sample format in appendix 1, but also include the NSN in the requirement line for each item.

A3.16.4. **Appendix #--Off-Base Sources of Basic Materials for Contingency Response Operations.** Sources, contact points, and types of materials available should be listed. If reciprocal aid support agreements have been made, include a summary or a copy in annex M. The recommended format follows:

Type of Material	Source	Point of Contact

A3.16.5. **Appendix #--Prepositioned WRM.** List prepositioned WRM which can be used in a contingency. Specify the location of the items. Some may even be stored at another base for your use. Describe procedures for getting authorization to use the items and access to them.

A3.17. Annex M--Support Agreements and Contracts. Include a summary or copy of all support agreements that apply to contingency response activities. This includes formal mutual aid agreements, host tenant support agreements, interdepartmental support agreements, inter-service support agreements, host nation support, and informal agreements. The summaries should include the organizations involved in the agreement; a brief description of the specific support to be provided; the conditions and procedures for requesting support; the names, addresses, and phone numbers of the points of contact. The most common for civil engineers are agreements for EOD and firefighting support.

A3.18. Annex N--Base Utility Systems and Waste Disposal. This annex should outline the layout and operation of the base utility systems, show how the systems can be isolated and protected, and explain backup measures. It should also describe non-normal operating procedures required for special situations. It also covers procedures for disposal of garbage, solid wastes, and toxic wastes (if not covered in annex G).

A3.18.1. **Appendix #--Electrical Power Supply/Distribution System.** Describe the power supply and distribution system. Include primary and secondary voltages, circuit and substation locations, and source of power. Include record drawings and single-line diagrams of prime and emergency electrical systems. Also include switch and circuit breaker positions. Identify areas that can be isolated from the main system. Note the number and location of other record drawings. Identify the point of contact for the local power company. Identify circuit or system components subject to frequent problems as these tend to be the first to fail.

A3.18.2. **Appendix #--Alternate/Emergency Power Sources.** Describe alternate primary power sources including tie-in locations, voltages, kilo-volt-amps, kilowatts (kW), and other details. List emergency generators, and floodlight sets by location and description. Show priority and sequence of recovery. They must be consistent with the facility priority list in annex H. Describe procedures and schedule for refueling generators. The suggested format for listing equipment follows:

Priority	Location	Description (Make/Model)	Condition	Size (kW)	Fuel (Type)	Operation (Manual or Automatic)	Approximate Running Time

Identify which emergency generators can assume the load directly and which units can be operated in parallel with the normal source. Describe the procedures for the base to handle an extended 30-day electrical power outage. Note mission critical facilities which require stable (conditioned) three-phase power.

A3.18.3. **Appendix #--Electrical Demand Reduction Plan/Utility Isolation.** Include a demand reduction plan, in increments of approximately 10 percent of the normal maximum demand, to the minimum necessary to operate without degrading the essential base missions. Describe specific steps required to achieve each level of reduction. Outline procedures to isolate sections of the base and, if required, provide power to critical facilities in that area.

A3.18.4. **Appendix #--Water Supply/Distribution System.** Describe the potable water supply source, storage, and treatment capacity. Include single-line diagrams of main distribution system with valve locations identified to facilitate shutdown and isolation. List record drawings by number and locations. Describe the vulnerability of the potable water supply to terrorist activities or natural disasters along with measures necessary to protect, monitor, and warn users when chemical or biological contaminants exist. If applicable, identify how to keep the water supplies and treatment facilities operating in flood conditions. Identify who will execute those measures and when. Include detailed procedures for operating any water treatment plants under emergency conditions. Specify procedures for maintaining proper chlorine residuals. Identify the point of contact for the local commercial water company. List all suitable off-base water sources. Describe water requirements to meet fire protection needs.

A3.18.5. **Appendix #--Alternate/Emergency Water Supply.** Describe alternate or emergency potable and nonpotable water sources on or near the base, including quantities available. Describe the means for obtaining the water. Find a nonpotable water source that can be used exclusively for firefighting. Identify emergency water distribution points which can be used when water is hauled to the base. If considered necessary, include procedures for controlling access to the water under such conditions to avoid chaos. This may require security police assistance to control crowds. A steady supply of water will eliminate panic.

A3.18.6**. Appendix #--Water Demand Reduction Plan/Utility Isolation.** As with the electrical system, include a demand reduction plan, in increments of approximately 10 percent of the normal maximum demand, to the minimum necessary to operate without degrading the essential base missions. Describe specific steps required to achieve each level of reduction. Outline procedures to isolate sections of the base and, if required, provide water to critical facilities in that area.

A3.18.7**. Appendix #--POL Supply, Storage, Distribution, and Emergency Backup.** Describe the various POL systems, including storage capacity, location of tanks and distribution system, and source of emergency stocks. List record drawings by number and location. Include a complete gas distribution system map and a list identifying each building and its gas loads in the order in which gas service should be shut off. USAFE bases should include the point of contact and describe the repair capabilities of NATO pipeline crews. Describe the locations of primary and backup gasoline and diesel fuel (JP8) sources required for operating BCE emergency vehicles and backup generators.

A3.18.8. **Appendix #--Heating, Ventilation, Air Conditioning, and Refrigeration (HVACR) Systems.** Describe the heating plant system or systems and the heating distribution system or systems in general terms: fuel types, storage capacities, and consumption rates must be included. Identify subsystems that can be segregated from the main system. Include refueling responsibilities and procedures. List record drawings by number and location. Identify HVACR systems which provide essential support to critical mission facilities. Describe each system, location of spare parts, and backup options.

A3.18.9. **Appendix #--Gas System.** Describe the base gas distribution system. Identify the supply points and location, type and size of gas lines. List record drawings.

A3.18.10. **Appendix #--Airfield Lighting.** Show layout of the airfield lighting system and describe its operation. Provide details on components, control system, and backup power. List quantity and location of repair materials and backup capability (bean bags). Cover procedures for laying out alternate systems.

A3.18.11. **Appendix #--Sewage Collection/Disposal System.** Describe the sewage collection and disposal system. Also describe alternate or emergency waste disposal methods. List record drawings by number and location.

A3.18.12. **Appendix #--Solid Waste Disposal.** Explain current procedures and identify disposal contractor's point of contact. Detail emergency procedures and assign responsibility for disposing of solid waste and garbage. This may require users to participate by taking their waste to a central location. There is no one good solution for all bases.

A3.18.13. **Appendix #--Toxic Waste Disposal.** Describe current method of toxic waste disposal and identify the point of contact for current disposal contractors. Explain emergency disposal procedures and assign responsibility for doing it.

A3.19. Annex P--Airfield Pavements. Describe all airfield pavements by location and type. Attach a drawing of airfield pavements. Identify all pavement that may be used as emergency runways or are capable of use by assigned or deployed aircraft. Identify pavement that can be used as alternate taxiways. Show locations of AM-2 RRR patch components, FOD covers, and associated crater and spall repair materials and equipment. List other methods of repairs such as local brands of cold or hot mix. List materials that are available on base to affect repairs. For materials that are not available on base, list sources of supply.

A3.20. Annex Q--Climatic and Geologic Factors. Describe in general terms the climatic factors such as rainfall, snowfall, temperature ranges, potential wind storms, and other factors that can affect contingency operations. Also include geographic factors, such as tides and elevations, that can affect contingency operations.

A3.21. Annex R--Damage and Reimbursable Cost Documentation. This annex should outline procedures for documenting damage to base facilities, utilities, and pavements. Photo documentation immediately following the crisis is often the most useful. Outline the local procedures for getting photographic support. The annex should cover CE support to the base legal office to document damage to civilian property as a result of an Air Force incident and to estimate the costs of repair or replacement. The annex should also outline provisions for capturing labor, equipment, and material costs in support of reimbursable activities. Approved Air Force support to civil authorities following a disaster is one example when this might be done. A collection work order needs to be set up for each incident.

A3.22. Annex S--Maps and Charts. List base requirements for maps and charts to support contingency operations. Include instructions and an example showing how to read the base grid map.

A3.23. Annex T, U, V, and W. These are optional annexes which can be locally defined to incorporate information or instructions which do not logically fit into other annexes.

A3.24. Annex X--Classified Annex. Since the vast majority of the information in this plan is unclassified, use a separately published classified annex to provide classified guidance and information without having to classify the entire plan. This annex can also incorporate CE-specific actions in support of the wing Emergency Action Procedures.

A3.25. Annex Z--Distribution. List the organization and number of copies each are to receive. Include base agencies, your major command, and all flights, sections, and shops within CE which need it.

Figure A3.1. Sample Cover.

1 CIVIL ENGINEER SQUADRON

1 July 1995

CIVIL ENGINEER CONTINGENCY RESPONSE PLAN

LANGLEY AFB, VIRGINIA

1 CES
Langley AFB, VA 23665
1 July 1995

CIVIL ENGINEER CONTINGENCY RESPONSE PLAN
TABLE OF CONTENTS

CONTENTS PAGES

Figure A3.2. Sample Table of Contents.

ii

Figure A3.2. Sample Table of Contents (continued).

Figure A3.2. Sample Table of Contents (continued).

Figure A3.3. Sample Basic Plan.

REMINDER: This list of appendixes and tabs is only a guide. The absence of an appendix or tab from this list does not mean it is "not needed". Likewise, its presence does not mean it is "required". Use as few or as many as you need to help the unit mount an effective first response to each contingency situation. Should you need to add locally defined annexes, use annexes T, U, V, and W.

1 CES
Langley AFB, VA 23665
1 July 1995

CIVIL ENGINEER CONTINGENCY RESPONSE PLAN
BASIC PLAN

REFERENCES: a. List any maps, charts, plans, publications, or documents needed to understand the basic plan. Include date and title of the items.
b. Avoid documents not available or that present common knowledge.

TASK ORGANIZATION: Since this is a CE plan, only CE flights and sections can be tasked.

1. SITUATION

a. General. Briefly describe the most probable conditions for implementing the plan. Separately describe the enemy attack, major accidents, or natural disasters which could threaten the base. Also address other contingencies covered by this plan.

b. Supporting Forces. List units or organizations outside CE which support this plan. Include their titles or unit designations. This includes augmenting Prime BEEF teams, other US military units, civil authorities, and foreign military units.

c. Assumptions. Include your major planning assumptions. Only assumptions which make the plan unworkable if not true and which are beyond the capability of the CE unit (or installation) to control should be included. An example of such an assumption is "spare parts will be quickly available to repair key vehicles needed for base recovery" or "all key vehicles needed for base recovery will be operational."

2. MISSION. Briefly state the mission of the CE unit when the plan is implemented. The CE mission must support the installation mission. The CE mission always includes the restoration or maintenance of the installation's capability to support its prime mission. The relief of human suffering and the protection of life and property are equally important missions which require civil engineer support. Include support you provide to other services, nations, and civil authorities.

Figure A3.3. Continued.

3. EXECUTION.

a. Concept of Operations. If helpful, include a brief concept of operations.

b. Tasks. Highlight the major tasks each flight or section must take to carry out the plan. Include any forces added by operations plans or support agreements. Include details in the annexes.

4. ADMINISTRATION AND LOGISTICS. Tell how civil engineers are to be supported and what support they must provide to themselves. In general terms, outline the sources for equipment and supplies and the support to be provided by others. Also list local support conditions which adversely affect plan implementation. As an example, an overseas base might be totally dependent on indigenous sources for one or more of its utilities. Since it is entirely possible that these services could be curtailed during a period of civil strife or war, highlight such information here.

5. COMMAND AND SIGNAL. Identify command relationships both external and internal to the CE unit. List CE control centers to be used and designate who commands the CE forces, control centers, and recovery teams. Outline the succession of command. The chain of command should be well defined for all people. State provisions for continuity of command. Include sufficient alternates for round-the-clock leadership for two manning scenarios: (1) full strength and (2) military personnel only (overseas theater bases) or civilian personnel only (CONUS bases). Overseas theater bases will also include provisions for command and control of augmenting forces, such as CONUS Prime BEEF teams. Such provisions should allow augmenting unit to maintain unit integrity when practical, even though responsible to the host BCE. Outline methods of communications to be used.

Annexes:

Annex A--Major Peacetime Accident
Annex B--Natural Disaster
Annex C--Enemy Attack
Annex D--CE Support for Miscellaneous Plans/Situations
Annex E--Firefighting and Rescue Operations
Annex F--Deployment Preparations
Annex G--Contingency Environmental Considerations
Annex H--Facility Priority Listing
Annex J--CE Personnel Shelters
Annex K--Personnel Augmentation
Annex L--Equipment and Supplies
Annex M--Support Agreements and Contracts
Annex N--Base Utility Systems and Waste Disposal
Annex P--Airfield Pavements
Annex Q--Climatic and Geologic Factors
Annex R--Damage and Reimbursable Cost Documentation
Annex S--Maps and Charts
Annex X--Classified Annex (PUBLISHED UNDER SEPARATE COVER)
Annex Z--Distribution

/s/

Joseph Smith, Lt Colonel, USAF
Base Civil Engineer

Figure A3.4. Sample Annex A--Major Peacetime Accident.

1 CES
Langley AFB, VA 23665
1 July 1995

ANNEX A TO CE CONTINGENCY RESPONSE PLAN
MAJOR PEACETIME ACCIDENT

REFERENCES: a. Base OPLAN 32-1, 25 Aug 94
b. List any other maps, charts, plans, publications, or documents needed to understand major accident response requirements. Include date and title.

TASK ORGANIZATION: List the CE flights and sections which are tasked.

1. SITUATION

a. General. Briefly describe the likely accidents which would require implementing this part of the plan.

b. Supporting Forces. List units or organizations outside CE which support this annex taskings. Include their titles or unit designations. This includes other US military, civil authorities, and foreign military units.

c. Assumptions. Include planning assumptions. Only assumptions which make the annex responses unworkable if not true and which are beyond the capability of the CE unit (or installation) to control should be included.

2. MISSION. Briefly state the mission of the CE unit for responding to a major accident, both on- and off-base.

3. EXECUTION.

a. Concept of Operations. Include a brief concept of operations. Be sure to include the basis for manpower requirements in the concept. For example: "Manpower requirements (except for the fire protection flight) should be based on two 12-hour shifts per day, 7 days per week for the first 30 days. Make provisions for responding with the total unit strength and with military-only at overseas bases. CONUS bases must make provision for responding with the total unit strength and with an essentially civilian-only force." Show how the unit will adapt using the fewer number of people, and describe what capabilities will be degraded until augmenting units and people can be found and trained. (This is especially important in annex C.)

Figure A3.4. Sample Annex A (continued).

b. Tasks. Highlight the major taskings each flight or section must take to support a major accident response.

4. ADMINISTRATION AND LOGISTICS. Tell how civil engineers are to be supported and what support they must provide to themselves. In general terms, outline the sources for equipment and supplies and the support to be provided by others. Also list local support conditions which adversely affect plan implementation.

5. COMMAND AND SIGNAL. Identify command relationship external and internal to the CE unit. List CE control centers to be used, and outline the succession of command. State methods of communications to be used.

Appendixes:

1--Notification, Recall, and Assembly [Use this appendix when there is too much detail to include in paragraph 5 above. This annex can be used to avoid repeating the same information in each appendix or tab in the annex. Do not use it if the information differs for each situation.]
2--On-Base Accident
3--Off-Base Accident
4--HAZMAT Spill
5--etc.
:
#--Communication Procedures [Use this appendix when there is too much detail to include in paragraph 5 above. This annex can be used to avoid repeating the same information in each appendix or tab in the annex. Include only common information which applies to all situations in the annex. Information which supplements or expands on this basic information for a particular situation or response team should be included in the appropriate appendix or tab.]

NOTE: The order and numbering of the appendixes is arbitrary. Use only the appendixes your base needs.

Figure A3.5. Sample Appendix for Annexes A, B, and C.

1 CES
Langley AFB, VA 23665
1 July 1995

APPENDIX 2 TO ANNEX A TO CE CONTINGENCY RESPONSE PLAN
ON-BASE ACCIDENT

REFERENCES: List any maps, charts, plans, publications, or documents needed.

1. SITUATION. Describe the range of accidents this plan covers and the conditions in which they could occur. This includes weather conditions.

2. PROCEDURES.

a. Notification. Describe procedures for notifying the unit and individuals to respond.

b. Unit Response. Highlight the basic mission of each response team/shop for an on-base accident.

3. LOGISTICS. Identify required support from outside the unit.

4. COMMAND STRUCTURE. Describe the base and unit command structure for responding to an accident.

5. COMMUNICATIONS. Describe the communications available during the crisis. If more than one radio net is used (for example, a BCE net, an EOD net, or a fire and crash rescue net), the procedures for passing and authenticating information from one net to the other should be described. All personnel using the net should understand individual or team call signs.

Tabs:

A--Notification, Recall, and Assembly [If desired]
B--Fire Protection Flight Operating Instruction
C--Mobile Command Post Operating Instruction
[If not included in Base OPLAN 32-1.]

Figure A3.5. Sample Appendix for Annexes A, B, and C (continued).

D--CMC (SRC or CSS) CE Representative Operating Instruction
E--CE Control Center Operating Instruction
F--On-Scene CE Representatives Operating Instruction
G--Readiness Flight Operating Instruction
H--EOD Flight Operating Instruction
J--etc.
:
:
M--Communication Procedures [If desired]

NOTE: The order of the tabs is not mandatory. Consider starting with the control functions and continue with the flights/shop/team in the order in which they are likely to respond.

Figure A3.6. Sample Tab to an Appendix in Annexes A, B, and C.

1 CES
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1 July 1995

TAB H TO APPENDIX 2 TO ANNEX A TO CE CONTINGENCY RESPONSE PLAN
EOD FLIGHT OPERATING INSTRUCTION--ON-BASE ACCIDENT

REFERENCES: List needed maps, charts, plans, publications, or documents.

1. TEAM COMPOSITION.

a. Team Leader. Identify source of team leader and position if possible.

b. Team Requirements.

AFS	Number of People Needed	Source
3E871	1	EOD Flight
3E8X1	3	EOD Flight

2. ASSEMBLY INSTRUCTIONS. Tell where the team/shop/flight is to assemble, how quickly the team must assemble, and what clothing and equipment each person is to bring to the assembly point. If certain individuals are to get vehicles, the instructions should specify who will get what vehicle in paragraph 4. The same applies to equipment and materials. When useful, indicate the minimum number of people needed for the team to respond.

3. TASK INSTRUCTIONS. Outline the function/mission of the team and specify each task the team must perform in order and, if required, tell when each task should begin and when it should be completed. For many tasks, this may not be possible due to the unlimited variations in accident situations or other crisis. Frequently tasks can be foreseen, but their timing and location cannot. As a minimum, be sure to cover the tasks which must be done to get the team ready and positioned to respond. Also include the likely initial tasks so the team can start work if communications are lost.

Figure A3.6. Sample Tab to an Appendix in Annexes A, B, and C (continued).

4. RESOURCES NEEDED.

a. Vehicles.

Type	Quantity Needed	Source/Location

b. Special Equipment.

Item	Quantity Needed	Source/Location

c. Materials.

Item	Quantity Needed	Source/Location

5. COMMAND AND SIGNAL. Tell who the team reports to. Describe how the team chief is to communicate with his or her boss. Specify who the team chief reports to if he or she loses contact with the boss. Indicate if code words may be used.

6. SPECIAL INSTRUCTIONS. Include any other important information not covered in other sections.

Figure A3.7. Sample Common Appendix for Communications Procedures.

1 CES
Langley AFB, VA 23665
1 July 1995

APPENDIX 9 TO ANNEX A TO CE CONTINGENCY RESPONSE PLAN
COMMUNICATION PROCEDURES

REFERENCES: As needed

1. EQUIPMENT.

a. Radios. Identify tactical and intrabase radio nets and the locations of the base stations and any relay sites. Indicate who will normally have the mobile or portable radios. Identify any other unit using the same net.

b. Telephones. Outline what phone connections are available in the control centers. List phone numbers for the various positions. Include cellular phones.

c. Field Phones. Describe field phone capabilities and locations.

2. PROCEDURES.

a. Radio Call Signs. List the CE call signs for each net used and the call signs for any other unit on the net. All personnel using the net should understand individual or team call signs.

b. Radio Discipline. Outline procedures to limit use of the radio in periods of intense activity so the time-sensitive transmissions can be received. Identify who will serve as the "traffic cop". For the CE net, recommend the radio operator in the CE control center.

c. Authentication. If more than one radio net is used (for example, a BCE net, an EOD net, or a fire and crash rescue net), describe the procedures for passing and authenticating information from one net to the other. Set up authentication procedures for an enemy attack scenario, but do not list the procedures here. They can be included in annex X.

d. Non-verbal Signals. Describe any non-verbal signals which may be used and explain what they mean.

Figure A3.7. Sample Common Appendix for Communications Procedures (continued).

e. Maintaining Contact with Response Teams. Outline responsibilities and procedures for maintaining contact with response teams and individuals. (This is important in an attack environment so that attack information can be passed along to teams and individuals in the field.)

3. MAINTENANCE SUPPORT. Identify units on- and off-base which can repair intrabase radio and tactical radio assets. List what capabilities they have and the point of contact. (Remember that taking a radio off-base can compromise your communications.)

NOTE: The information presented in this appendix should be presented as a tab if it applies only to the actions for one appendix.

A-9-2

Figure A3.8. Sample Common Tab for Unit Notification and Recall.

1 CES
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1 July 1995

TAB A TO APPENDIX 1 TO ANNEX A TO CE CONTINGENCY RESPONSE PLAN
NOTIFICATION, RECALL, AND ASSEMBLY

REFERENCES: Base OPLAN 32-1

1. NOTIFICATION.

a. Initial Notification to CE. Explain how CE is notified and by whom.

b. CE Control Center Responsibilities. List the tasks and responsibilities of the CE control center and other control locations such as the fire alarm room.

2. RECALL PROCEDURES. Describe recall procedures to be used during duty hours and after duty hours. A pyramid recall system is most often used after hours

3. ASSEMBLY. Tell where unit personnel are to assemble, how quickly, and what each person is to bring to the assembly point.

NOTES: The information presented in this tab can also be presented as an appendix if it applies to all of the actions required in an annex.

To reduce confusion, only one approach to unit notification, recall, and assembly should be used for most situations. When selective recall or response is required, explain the variations in the appropriate appendixes or tabs.

Figure A3.9. Sample Annex H--Facility Priority Listing.

1 CES
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1 July 1995

<u>ANNEX H TO CIVIL ENGINEER CONTINGENCY RESPONSE PLAN</u>
FACILITY PRIORITY LISTING

Priority	Grid Location	Facility	
1	G.3/5.7	1142	Hardened Aircraft Shelter
1	G.2/4.9	1151	Hardened Aircraft Shelter
2	C.0/8.3	563	Wing command post
:			
:			
24	K.2/2.2	342	Nose Dock 4

NOTE: It is possible to assign the same priority to a group of buildings, for example TAB VEE shelters within a given area. Include the common name along with facility number as shown above.

STEPS IN PLAN DEVELOPMENT

A4.1. Introduction. There are a number of valid ways to develop a plan. This attachment outlines one proven method which has five steps: research, preparation, coordination, publication, and review. The approach can be used in either military or civilian planning and can be used whether you are preparing an entire plan or just contributing an annex to one. This attachment is tailored to plans written at base-level by people in the civil engineer readiness flight.

A4.2. STEP 1--Research. Plans are useful only if they are backed by good research. This is where you try to determine what your unit (or base) may be required to do and the place, conditions, and circumstances under which the unit (or base) may have to operate if the plan is executed. Research involves at least five sub-steps: understanding the planning task; learning the base mission; reviewing existing plans and guidance documents; analyzing the hazards and threats; and assessing unit (or base) response capability.

A4.2.1**. Understand the Planning Task.** This is the first step in any planning process. You need to establish up front what your task is and what product you are expected to produce. Be sure you know what the plan OPR wants from you. Be flexible. As you learn more during your research, you may need to modify the task.

A4.2.2. **Learn the Base Mission.** The basis for any planning is knowing the mission of the base. The wing's mission might be air superiority, ground attack, precision attacks at night, air defense suppression, heavy bombardment, etc. Knowing this will help you identify the type and quantities of aircraft, munitions, fuel, and other support materials the base will probably have on hand, the type of training and combat operations the wing will conduct, and the probable distance your wing may be from the front lines. For example, a heavy bomber wing may have only a few aircraft, but vast quantities of large "dumb" weapons, nuclear weapons, and POL, etc. The wing will probably conduct area bombing of troop concentrations, industrial areas, rail marshaling yards, etc., and it will probably be located at a large airfield well outside the enemy's reach. A ground attack wing, however, may have several dozen aircraft, large quantities of fairly small, but technically advanced weapons, and smaller stocks of POL, etc. It will probably conduct close air support or air interdiction missions and be located fairly close to the front lines. These differences will require you to modify your plans to account for various priorities, difficulties in protecting the assets, housing the population during a crisis, responding to accidents, recovering from a natural disaster and so on. As you complete your research, you will develop a fuller appreciation of the mission.

A4.2.3. **Review Existing Plans and Directives.** You will seldom need to create a plan from scratch. First review the plan you are to modify. Look at the documents to which the plan refers and read them too. Look at the documents your supporting intelligence shop has. Many intel shops have the *Worldwide Threat to Airbases* and studies of the various weapon systems the enemy could bring against you. The security police, fire department, and your supporting medical facility will have copies of their support agreements. The logistics plans shop, contracting, and several other agencies may also have copies of support agreements with tenant units and local authorities. This step is necessary to avoid "recreating the wheel".

A4.2.3.1. **Check the Supported Plans.** Many base-level plans are written to support someone else's plans. The plan you are supporting may have been written by higher headquarters, another military service or agency, a local civilian agency, or the military and civil forces of another nation. If possible, always get and review a copy of the plan you are trying to support. It will tell you, with a fair degree of clarity, what the authors expect your unit to do for them, who will control the implementation of your plan, where you will be expected to go, what you should bring, and so on. Plans written above the MAJCOM-level are normally too general to help you write a base-level plan.

A4.2.3.2. **Check Governing Directives.** The AFIs, as supplemented by the MAJCOM, will usually contain good information about what the plan is supposed to address and how it is to be written. Specific support tasks or responsibilities may also be covered in the AFI, especially if the task is required by law. Support Agreements or contracts can provide another source of information about the extent of operations you may be required to perform, when, and under what conditions. Examples of governing directives include AFI 10-212, *Air Base Operability Program*; AFI 10-211, *Civil Engineer Contingency Response Planning*; AFI 10-403, *Deployment Planning*; AFI 32-4001, *Disaster Preparedness Planning and Operations*; AFI 32-4002, *Hazardous Material Emergency Planning and Response Compliance*; AFMAN 10-401, *Operation Plan and Concept Plan Development and Implementation*, etc.

A4.2.3.3. **Check Related Publications.** Check AFIND 2, *Numerical Index of Standard and Recurring Air Force Publications* for related publications. If you are writing a hazardous material accident response plan, you should check the index for publications which refer to environmental, hazardous material, and accident response subjects. Specific examples would be AFI 32-4001, AFI 32-4002, and AFMAN 32-4004, *Emergency Response Operations*.

A4.2.3.4. **Verify Currency of Information.** Nothing can destroy the value of your plan, and your credibility, as quickly as change.

- Check your directives. Find out if the directives you are using to justify your requirements and to task other agencies have been superseded.
- Check the supported plans. As the down sizing of military forces continues, you need to check the plans you are trying to support. You may need to revise your plans because units or bases you were planning to support, or from whom you expected support, may be gone. Also, as the threat or your wing's missions change, you may not be required to perform the same functions at the same intensity as before.
- Ensure all referenced materials are valid. These could be checklists, other annexes of the plan, other plans, regulations, forms, operating instructions and a variety of other items. You may often find the specific reference has changed location, been deleted, or no longer applies to the situation described.
- Check background files for pending information. AFIs are subject to modification. Look for messages or memoranda which establish new procedures, policies, or requirements. For example, USAFE may decide to revise its policy on the operation and maintenance of the Survivable Collective Protection System. You need to know that before you start writing the OPLAN Annex which deals with shelters. Similarly, if the MAJCOM or wing has just worked out a new support agreement with the local nuclear power station, you should incorporate the changes into your plan.
- Make certain the addresses, organizational symbols, abbreviations, etc., are correct.

A4.2.4. **Hazard/Threat Analysis.** A systematic hazard/threat analysis is an essential step in developing emergency, disaster, contingency, or operations plans. The analysis identifies all possible threats and vulnerabilities, presents historical information about past disasters, assesses future probability and frequency of emergencies, and validates gathered information. Considerations include predictability, frequency, controllability, duration, scope, and intensity of hazards or threats. There are three basic steps in conducting a threat and hazards analysis:

A4.2.4.1**. Hazard/Threat Identification.** In this step, gather information on the specific major accidents, natural disasters, hazardous material spills, and enemy attacks your base could face. You must know the kind and levels of damage you can expect from your foes. For example, how will the attack be conducted, what kind and size of weapons will they bring to bear against you, what are their probable targets, how often will they attack, etc.? Learn the location of the hazards.

A4.2.4.2. **Vulnerability Analysis.** Identify the parts of the base or off-base community that may be affected by each hazard or threat; the population within each zone that is subject to harm; critical facilities or functions (for example, hospital and command post) at risk; and property and environmental systems that may be damaged.

A4.2.4.3. **Risk Analysis.** A risk analysis provides a means to judge the relative likelihood of a hazard/threat occurring and the magnitude of harm to people and mission should that hazard/threat occur. Said another way, you try to determine the most probable incidents and their worst possible impact. The analysis includes judgments of the probability of occurrence and severity of consequences. Consider natural disasters and major accidents as part of your planning for both peace and wartime. Nature is not patriotic and does not take vacations. During combat operations your chances of someone creating an accident go up because people are tired, equipment wears out, and people are not paying as much attention to safety as they should. You need to know what kinds of incidents are most likely to occur and how they might affect the wing's mission in the worst manner. For example, ask if the base is subject to typhoons, hurricanes, tornadoes, floods, heavy snow storms, lightning storms, sand storms, earthquakes, forest fires, etc. Are you likely to suffer from sabotage or terrorist attacks? How will these incidents affect central power stations, POL dumps or supply lines, natural gas or fuel lines, water lines or towers, pumping stations, access roads, etc.? Are there any points at which multiple utility lines converge which could increase the danger or damage if they were affected by the incident? What key command and control functions could be adversely affected and how could they be protected?

A4.2.5**. Capability Assessment.** Next develop a realistic evaluation of the bases' ability to prevent or respond to accidents, natural disasters, hazardous material spills, and enemy attack. Understand what resources the wing can bring to bear on various peace and wartime contingencies, how well the wing is trained and prepared to respond, and where the wing is weak. For example, how many fire trucks, of which kind, are available during peacetime? What are their capabilities? Is this quantity and their capabilities sufficient? Where are they located? Is this location close enough to allow them to fulfill their duties? Does this location provide adequate protection from accidents, disasters, or attacks? Will you have more trucks available in wartime? If yes, where would you get them? Can you use the wartime fire trucks to help respond to a peacetime incident if you need them? Where are the additional trucks located? Are these vehicles protected? How quickly can you reach them, equip them, man them, and make them fully operational? These same kinds of questions may be applied to nearly any wing organization.

A4.2.5.1. Be sure to include in the capability assessment other military services, host nation, allied military forces, civil authorities, and government organizations that agree to help the base respond to and recover from a disaster, accident, or attack. Be familiar with the kind and levels of support you can expect. For example, what kind of facilities can you use, what kind of communications capabilities will they provide for you, how many vehicles of which types can they provide for your support, etc.?

A4.2.5.2. Know who controls which resources, where they plan to locate the resources, and how well those resources are protected from the affects of weapons, disasters, or accidents. Since these resources will be used to respond to various contingencies outlined in your plans, you should know who to contact in order to coordinate or implement the plan. You must also know where the resources are going to be and how well they will be protected so you can judge whether or not they will be readily available and undamaged when the need for them arises.

A4.2.5.3. Know the wing's priorities for protecting its resources. These priorities may change depending on the situation. For example, in a peacetime CONUS environment the wing may want to prioritize support for the local authorities during a natural disaster. During combat overseas, however, the wing will probably not be willing to expend many of its assets to respond in support of the civil authorities. You must know what the wing wants to protect when and how well it must be protected.

A4.2.6. **Other Sources of Information.** Two other sources of information should be considered when researching a plan.

A4.2.6.1. **On-Base Agencies.** The wing plans shop should be able to tell you all about the wing's mission. Group and unit planning offices will usually know their capabilities and weaknesses and they will be able to tell you who owns what, where it is, and if it is protected. With them, you may need to determine if the current level of protection is adequate. The wing's supporting intelligence shop and the Office of Special Investigation should be able to tell you who your enemies are. The security police, safety office, and fire department should be able to help you with records on major accidents or mishaps. The bioenvironmental engineers, the fire department, and the logistics group's maintenance, supply and transportation units should be able to provide the location, quantities, common uses, and transportation details of most hazardous materials on base. The supporting weather shop should be able to give you information on the local natural disaster hazards.

A4.2.6.2. **Off-Base Agencies.** Consult with local Civil Defense, Red Cross (or Red Crescent), host nation civil and military authorities, and other emergency response agencies and officials. This can help you form a clear picture of the kinds of hazardous materials transported near the base and the frequency with which they pass. They may be able to provide you with a local history of the area's natural disasters, major accidents, and intentional acts which caused significant damage. (Set forest fires, vandalism on facilities, etc.) This consultation can also help clarify what they think you can do for them and what they can do for you. The US Army Corps of Engineers can help you determine the probability of your base suffering floods or other kinds of related disasters. USAF units with similar missions or in similar areas and your MAJCOM can give you guidance on the historical trends of incidents which happen to bases in similar circumstances or with similar missions. If you are overseas, contact the units which provide your short range and point air defenses and your perimeter security (if other than USAF security police).

A4.3. STEP 2--Preparation. Plans are easier to use if they contain the right information in the correct format and are well written. Small things, like correct spelling, grammar, and punctuation really do count. Some commanders will not approve a plan if it contains simple errors.

A4.3.1**. Content.** Prepare a first draft. Write the plan the way you think it should be. Keep it realistic, legal, and consistent with wing or higher headquarter guidance. The plan must answer the classic five Ws: who, what, when, where, and why. Sometimes the plan may also need to address how. Discuss who will do what, when and where they will do it, why they will do it, how they will do it, and what they will use. The answers to these questions will change at different stages of preparation, response, or execution. Provide answers to at least the following questions:

A4.3.1.1**. Who:**

- Supports us?
- Do we support?
- Directs implementation or termination of which parts of the plan?
- Funds which parts of the plan?
- Commands or controls the resources (people, vehicles, supplies, materials, and equipment) which will be used to execute various parts of the plan?
- Will operate the equipment necessary to execute the plan?
- Will write which parts of the plan and the supporting documents (checklists, rosters, equipment lists, diagrams, etc.)?

A4.3.1.2. **What:**

- Situation or set of circumstances is each part of the plan designed to handle?
- Are the basic assumptions?
- Specific duties or functions are various agencies supposed to perform in order to execute the different parts of the plan?
- Resources (people, equipment, vehicles, supplies, or material) are the various agencies supposed to provide or employ to execute the different parts of the plan?
- Criteria will be used to judge progress of plan execution?

A4.3.1.3**. When:**

- Do different parts of the plan take effect?
- Will funds become available for each part of the plan?
- Must resources (people, equipment, vehicles, supplies, or material) be made available, prepared, positioned, or employed in order to execute each part of the plan?
- Does the plan terminate?
- Do you file which reports?

A4.3.1.4. **Where:**

- Do people perform their duties or functions to execute each part of the plan?
- Must resources (people, equipment, vehicles, supplies, or material) be assembled, stored, sent or employed to execute or terminate the plan?
- Do you send which reports?

A4.3.1.5. **Why:**

- Do we write and execute this plan? (purpose of the plan.)
- Do we perform certain aspects of this plan in a certain order?

A4.3.1.6. **How:**

- Will you communicate or pass notification?
- Will you evaluate the effectiveness of operations or the quality of work?

- Should you disperse resources?
- Do you account for resources?
- Will you protect your resources?
- Do you report your operations, attack results, the wing's status, etc.?

A4.3.2. **Format.** The format is specified in the governing directives. For example, AFMAN 10-401 dictates the outline of a war plan, and AFI 32-4001 gives the format for a disaster or accident plan. The format for each is similar.

A4.3.3**. Style.** Write the draft plan in a style easy to read. Common writing admonitions apply. Get a copy of AFH 37-137, *The Tongue and Quill* and use it.

A4.3.3.1. Use plain English.

- Use simple, familiar words, not jargon or unnecessary abstract, technical words.
- Use clear, grammatically correct sentences that average 20 or fewer words.
- Avoid illogical or inconsistent shifts in point of view (tense, person, or voice).
- Present material in a logical, orderly sequence.
- Keep each paragraph as short as possible, consistent with the subject matter.

A4.3.3.2. Use active voice.

- Watch out for the verb "to be" (am, is, are, were, was, be, being, been) and a main verb ending in "ed" or "en".
- Put the doer before the verb. (Example: "Supply will provide four, 1 gallon buckets.", not "Four, 1 gallon buckets will be provided by Supply.")
- Drop unneeded verbs. (Example: "Equipment lists are in attachment 1.", not "Equipment lists are shown in attachment 1.")

A4.3.3.3. Edit for proper punctuation, spelling, and grammar.

A4.3.3.4. Include illustrations, tables, graphs, etc., as necessary to clarify your point. For example, include a diagram of the parking arrangement at the Disaster Control Group assembly area, or a table to show how much of which type of equipment the decontamination teams will need.

A4.4. STEP 3--Coordination. Failure to properly coordinate a plan can cause confusion, consternation, and conflict. Plans should not come as a surprise to anyone except the enemy.

A4.4.1. Who should coordinate? Every agency that is tasked to participate in the plan should review and comment on it.

A4.4.2. **Steps in Coordination.** Revise the plan as necessary after each step in the coordination process. Some comments and recommendations for change are inappropriate or based on incorrect or outdated information. If you decide not to make a suggested change, contact the commentor and explain your reasons.

A4.4.2.1. Have experts within the squadron review and comment on the draft first. These people may have an insight, experience, or knowledge you lack. Their advice could improve the plan and save your credibility.

A4.4.2.2. Obtain comments from functional experts. These are the working level experts you deal with regularly. They should be the most familiar with their units' abilities, responsibilities, and shortages. They help improve the plan and clear up the details before it goes to your boss and other commanders for review.

A4.4.2.3. Obtain unit commanders' comments or approval. This is the opportunity for squadron commanders to get things set up the way they want. They will usually be particularly interested in funding, manpower, and equipment issues. You may need to brief them a couple times before you get the plan approved. Always brief your boss first.

A4.4.2.4. Get approval from local civil authorities, other services, and host nation equivalents when they are players.

A4.4.2.5. Obtain group commanders' comments or approval. As with the squadron commanders, group commanders will want things set up their way. They may know less about the specific rules than the unit bosses do, but they have a better view of the "big picture". Their comments may reflect larger issues.

A4.4.2.6. Obtain wing commander’s comments or approval. This is the ultimate test. In general, if the plan gets this far there should be very little need for changes. Be ready to brief the wing commander if required. Cover the highlights. Go into details only if asked, but be ready to cover them. He or she will probably have very little idea of the mundane rules, but will be extremely familiar with MAJCOM requirements, overall policy, and direction.

A4.4.2.7. Get higher headquarters approval, if necessary. Some of your plans may require coordination with higher headquarters, especially if they are in support of a particular contingency or crisis.

A4.4.3. **Methods of Coordination.** The methods are arranged from the slowest to the fastest. The slowest method is usually least expensive and the most thorough. You may use more than one or a combination of these methods for the same plan.

A4.4.3.1. **In Turn.** This is the slowest method because each office or agency must complete their review and make their comments before they pass the document on to the next office or agency on the coordination list. Although slow, this method affords the units the best opportunity to conduct a thorough review and compare their comments to those made by others. Give each office or person a separate suspense date, that way they will not hold it for several weeks and pass it on to the next guy with 1 or 2 days left before the deadline. Two methods of distribution which you can use are:

- Through base distribution or by mail: Be sure to follow up your distribution with telephone calls. Keep track of where your plan has gone and know who should see it next.
- Hand-carried: This method is more involved, but you keep better track of the document. Basically, you take the plan to an office or agency, let them review it for a few days, then pick it up from them, and deliver it to the next office or agency. This gives you the opportunity to discuss the plan with the reviewers if they have questions or need help.

A4.4.3.2. **Shotgun.** This method provides a good combination of thorough review and quick response. Each office or agency gets their own copy of the document for their review and comment. Units do not get to see what others have said, so you can get duplication of comments. Once you get the document back, you have to review each copy and consolidate the comments. It does take a lot of paper. Decide whether to hand-carry the draft plan to everyone or send it by distribution or mail. You reduce the chance it will get lost by hand-carrying and also save a day in distribution.

A4.4.3.3. **Conference.** A conference is the fastest way to review a plan. It is also the best way if you must confer with other units to complete the plan. It is expensive because you take people from their regular jobs. However, you may be able to discuss the plan and fix it on-the-spot, hopefully in 1 day. It can be carried out in-person or by teleconferencing.

- In-person. In this method, each agency sends a representative and all gather at the same time in the same place to review the plan. Be sure to get a big enough room and have a chalk board, note pads, and other materials available so you can all take notes or illustrate your points.
- Teleconference. This method is useful to get units together which are not on the same base. It has some of the same advantages as the in-person conference, but it is easier to attend. You cannot see each other, so it is more difficult to run properly. When holding the conference call, use a set agenda and do not jump from one subject to another. You can lose people very easily that way.

A4.4.4. **Paperwork.** Create a good paper trail during the coordination process. You may need to go back to people and get additional clarification or request more changes. You definitely need to document the plan review. Most commanders want proof their people reviewed and agreed with the plan before they review and approve it. Your cover memorandum should tell people why they are reviewing the plan, the purpose of the plan, which parts of the plan they are to review, what they should do if they have questions or comments (do they contact you, the OPR, write on the plan itself, or what?), when they should return the plan and to whom, and any other information they should know (background, pending changes to policy or procedures, etc.)

A4.5. STEP 4--Publication. Find out who is responsible for publishing the plan at your base. If not you, it may be done by the wing plans shop. They will usually require you to document the plan review and make any required changes. They may also ask you to prepare the DD Form 844. This form is required if you want to publish any kind of plan, publication, or form, etc.

A4.6. STEP 5--Review. Plans are never permanent. They require change for any number of reasons. Plan reviews help keep you up to speed with the changes. In general, you should conduct a plan review: annually, when the threat changes, when the mission changes, and when unit capabilities change.

INSTALLATION DISASTER PREPAREDNESS TRAINING

A5.1. Training Program Introduction. Disaster preparedness and response capabilities at a base rely on the coordinated efforts of many people and units who are not disaster preparedness professionals. Consequently, an effective installation-level disaster preparedness program requires focused training for them. The program is broken down into two main sections: planning and management; and disaster response. Standard disaster preparedness courses provide base level training to support the activities in these two areas.

A5.1.1. Installation-level training helps develop the knowledge and proficiency needed by the disaster response force (DRF) during disaster operations and by individuals during NBC and conventional attacks. The training covers command and control; survival in an NBC environment; shelter operations in peace and war; hazardous material accidents; camouflage, concealment, and deception; and more. The disaster preparedness training program also provides the courses to maintain currency, revisit deficient subject areas, and familiarize people with procedural changes and new equipment. Major commands set the requirements and frequency for refresher training.

A5.1.2. This attachment is designed to help CE readiness flights package and deliver effective disaster preparedness training. The source document is AFI 32-4001, *Disaster Preparedness Planning and Operations.*

A5.2. Training Objectives.

A5.2.1. Training must be relevant and realistic. The readiness flight should use hands-on training whenever possible.

A5.2.2. Tailor the training. Every base has a different mission, different natural disaster threats, different mobility commitments, and different enemy threats. Tailor your training to address these differences. A base in Florida should certainly stress hurricane threats in its courses. California bases would obviously tailor their training to include earthquake threats. Other factors to consider are manpower and resources. For example, if your unit does not have a piece of equipment such as the M17 series mask, nor will they have the mask if they are deployed, then adjust the training accordingly.

A5.2.3. Training must continue within the unit. Individuals need to take the knowledge and skills learned in the classroom and apply them to the job. For example, individuals attending NBC defense training need to practice their wartime skills at their unit while wearing the chemical protective equipment.

A5.3. Course Listings. This list is current at the time of publication. Other courses may be added.

A5.3.1. **Disaster Preparedness Support Team (DPST) Course.** This course is designed for members assigned to the Disaster Preparedness Support Team who may have to augment the Readiness Flight during contingencies. Members are assigned from units throughout the base (usually junior NCOs and airman). The team usually ranges between 6 and 12 people. Team members can be trained in any topic that the primary disaster preparedness personnel perform at the installation. Typically, this course concentrates on NBC plotting, predicting, warning, and reporting; nuclear accident responses to include decontamination, contamination control and radiation detection equipment; and other major accidents. The class averages 12 hours with additional time required for NBC plotting.

A5.3.2. **Shelter Management Team (SMT) Course.** This course is for personnel who must activate and operate a protective shelter. Units that are designated as requiring a shelter must appoint a team responsible for all shelter operations. As a minimum, a shelter supervisor and assistant must be appointed and trained. Additional members may be appointed once the shelter is activated. These members would be then be briefed on their responsibilities. Shelter operations will vary according to the threat. For example, the shelter may be activated due to a chemical attack, nuclear fallout, natural disaster, or a hazardous materials accident. The objectives of the course concentrate on shelter set-up, personnel accountability, shelter stocking, contamination control, and exposure control for radioactive fallout. SMT members at locations whose primary threat is from nuclear attack will train shelter supervisors, exposure control, and contamination control monitors. They are not required to receive radiological training (instruments, exposure control, contamination control, etc.) until an increase in the alert posture. The class averages 7 hours with additional time required for shelter specific requirements.

A5.3.3. **Contamination Control Team (CCT) Course.** This course is for unit CCT members. As a minimum, maintenance, transportation, civil engineer, and medical units will establish a contamination control capability. The course focuses on types of decontamination scenarios such as wartime NBC contamination, peacetime nuclear contamination, and hazardous materials. The course provides knowledge and skills for contamination control planning and operations and is supplemented by the unit on procedures, facilities, and equipment. Wartime procedures should be taught when there is an increase in alert posture. If members are not pretrained, units must maintain procedures to complete CCT training when or before they are activated. The class averages 4 hours with additional time required for power-driven decontamination equipment.

A5.3.4. **Unit Disaster Preparedness Representative Course.** Each unit assigns a disaster preparedness representative to manage the unit program. This course provides the knowledge to plan and manage that DP program. The training should focus on unit responsibilities for planning, response, and recovery during emergency operations according to the threat at your particular installation. This includes major accident response, natural disasters, as well as air base operability functions for enemy attack scenarios such as camouflage, concealment, and deception. The training also addresses requirements for other disaster preparedness courses that unit personnel may require and the disaster preparedness information program. The class averages an hour and a half.

A5.3.5. **Disaster Control Group (DCG) Course.** This course is for the on-scene commanders (OSC) and on-scene DCG representatives. Members are either organization chiefs or designated alternates. The course provides knowledge and skills for field command, control, and communications during peacetime emergency operations. The course should also be supplemented by briefings from a variety of base agencies and local community offices such as the local emergency planning committee (LEPC), mortuary affairs, mental health (post-disaster trauma), wing safety (accident investigation procedures), and other first responders such as Security Police and Medical experts. The class averages 8 hours, including the time required for HAZMAT Level 1, Awareness training.

A5.3.6. **Exercise Evaluation Team (EET) Course.** EET members are selected from most every unit on base. Members are based on experience and therefore can vary widely according to rank. This course provides the EET chief and members the basic knowledge and skills to plan, conduct, and evaluate DP-related exercises. Advanced knowledge is obtained through supplemental courses based on areas the individual will be required to evaluate. For example, if an EET member is tasked to evaluate operations during an Attack Response Exercise, then that EET member should also receive NBC Defense training. The class averages 2 hours with additional time required for supplemental training.

A5.3.7. **Nuclear Biological Chemical (NBC) Defense Training Course.** Provides initial NBC defense training to people operating in, or deployable to, a chemical-biological (CB) threat area. AFI 32-4001 lists requirements. This training should focus on pre, trans, and postattack procedures following enemy attacks. This course assumes a chemical attack as a major threat but should also address conventional, biological, and nuclear warfare defense actions, individual protective equipment, attack reporting procedures, and contamination control area processing procedures. Additionally, the training should address Air Base Operability and passive defense such as Camouflage, Concealment, and Deception (CCD) concepts and procedures. NBC Defense training compliments the chemical agent symptoms and treatment portion of the Self-Aid and Buddy Care (SABC) course and unit individual NBC defense training. During the initial course, conduct a mask confidence training exercise to enhance the training received on the protective mask. The class averages 8 hours.

A5.3.8. **CCD Planners Course.** This course instills the basic planning information and CCD knowledge to provide effective inputs to the base CCD plan. This training also gives the requisite knowledge to manage a unit CCD program and to properly evaluate unit, base-wide, or deployment location CCD exercises. Procedures taught must be applicable to the threat and location of the installation. All three CCD course are newly established. This could require up to 40 hours of training,

A5.3.9. **CCD Trainers Course.** This course targets unit trainers who will teach, supervise, and manage personnel in their units who employ CCD measures such as camouflage screening, smoke generators, and decoy employment. A thorough understanding of CCD principles, assumptions, and measures is important. Additionally, the threat to the installation or deployment location must be carefully assessed and only those measures should be taught as necessary to defeat enemy threat sensors. This course could last 24 hours.

A5.3.10. **CCD Users Course.** Unit trainers present this course to people who will conduct or directly supervise the hands-on employment of CCD measures as applicable according to the unit mission, and the threat at the installation or deployment location. Examples of CCD measures include camouflage screening, smoke and obscurants, decoys, forestation and vegetation projects, tonedown and blackout procedures, and electronic countermeasure operations. This course could last anywhere from 4 to 12 hours.

A5.3.11. **Base Emergency Preparedness Orientation Course.** This course is mandatory for all military and civilian personnel and recommended for military family members. The course should be part of the Individualized Newcomer Treatment and Orientation (INTRO) Program or be incorporated into NBC defense training. It is included in the Ancillary Training Program. It provides knowledge on the most likely threats to the base and measures to survive during disasters. Tailor it to disasters likely to occur at the installation. Refresher training is accomplished through installation information program recurring education.

A5.3.12. **Control Center Course.** This course is for personnel who must activate and operate control centers during contingency operations. AFMAN 32-4004 lists the recommended units that require a control center to support Disaster Response Force activities. The objectives of the course concentrate on the make-up, roles, and responsibilities of the Disaster Response Force; command and control; major threats to the installation; and relationships between unit control centers and the Contingency Management Center and/or Command Post. Additionally, members of the Contingency Management Center should attend this training. The class averages 2 hours.

A5.4. DP Training Strategies. DP instructors should apply the fundamentals of instruction found in AFI 36-2201, *Developing, Managing, and Conducting Training*, when designing and delivering training. The instructor must ensure each student masters learning objectives before awarding credit for course completion. When students do not master the lesson objectives, the instructor may use on-the-spot-critiques, remedial training, one-on-one training, etc., to correct problem areas. Teach teams or individuals only what is needed to accomplish assigned duties.

A5.5. Readiness Training Packages (RTP). RTPs are available for almost every topic required for disaster preparedness courses. These RTPs are used to develop a master course of instruction in order to provide consistent, standardized training. RTPs should be tailored to the threat, local installation procedures, and they should reflect the most recent revisions to the RTP's reference material. Each RTP contains four parts. Part I (Cover Sheet) lists the lesson title, training method, technical references, aids and handouts, lesson objective, organizational pattern, suggested courses that the RTP would be appropriate for, strategy, and lesson outline. Part II contains the body of the lesson plan including the introduction, main points, and conclusion. Part III is the evaluations section. This section lists the required task steps and a list of knowledge questions. The questions should be used to develop a final course exam. The minimum number of questions to be used is listed in the LESSON OBJECTIVE, Part I. Part IV lists any related materials or attachments used to teach that particular lesson.

A5.5.1. RTPs are separated into specific subject blocks listed in AF INDEX 11, *Index of Readiness and Disaster Preparedness Training Packages*. AFIND 11 also lists RTPs that are rescinded and under development. Use this index to ensure the currency of your RTPs.

A5.5.2. Most RTPs involving technical equipment or detailed procedures will include an "Instructor's Note" on the reference. Instructors are encouraged to personalize the lesson plan. However, they should always use the base's master course of instruction (COI) as the standard.

A5.5.3. The type of RTP determines the method of evaluation. Use performance standards to evaluate task steps identified in Demonstration-Performance RTPs. Use test items for subject knowledge testing. Some RTPs are used for briefings only and do not require test items in order to meet lesson objectives.

A5.6. Master Course of Instruction (COI). Develop a master COI for each required course. Personalized lesson plans are encouraged and allow flexibility on how to present the material and in which order. However, although each instructor is encouraged to personalize individual lesson plans, a master is required to standardize the topics taught for each course. To develop a COI:

- Determine your training objective based on threat, mission taskings, manpower, and available equipment.

- Start with the recommended list of topics (RTPs) provided in table A5.1 and adjust the list according to your training objective. Include training materials developed locally or by the MAJCOM, FOA, or DRU.
- Tailor the individual subject topics (RTPs) according to your training objective.
- Prepare an overall course introduction, course objectives, and conclusion based on the subjects included and type of course. One option is to consolidate the Part I from the selected RTPs to use as an overall course objective list. Another option is to keep the Part I with each RTP for reference prior to teaching that subject area.
- Consolidate and group in the your desired order, the RTP materials for each course.
- Develop a test and answer key using suitable questions from Part III of each RTP used.

Following these steps, your master course of instruction should contain the course objectives and course outline, followed by each of the individual RTPs that will be taught, finishing with a course conclusion and test. See figure A5.1 for a sample course of instruction.

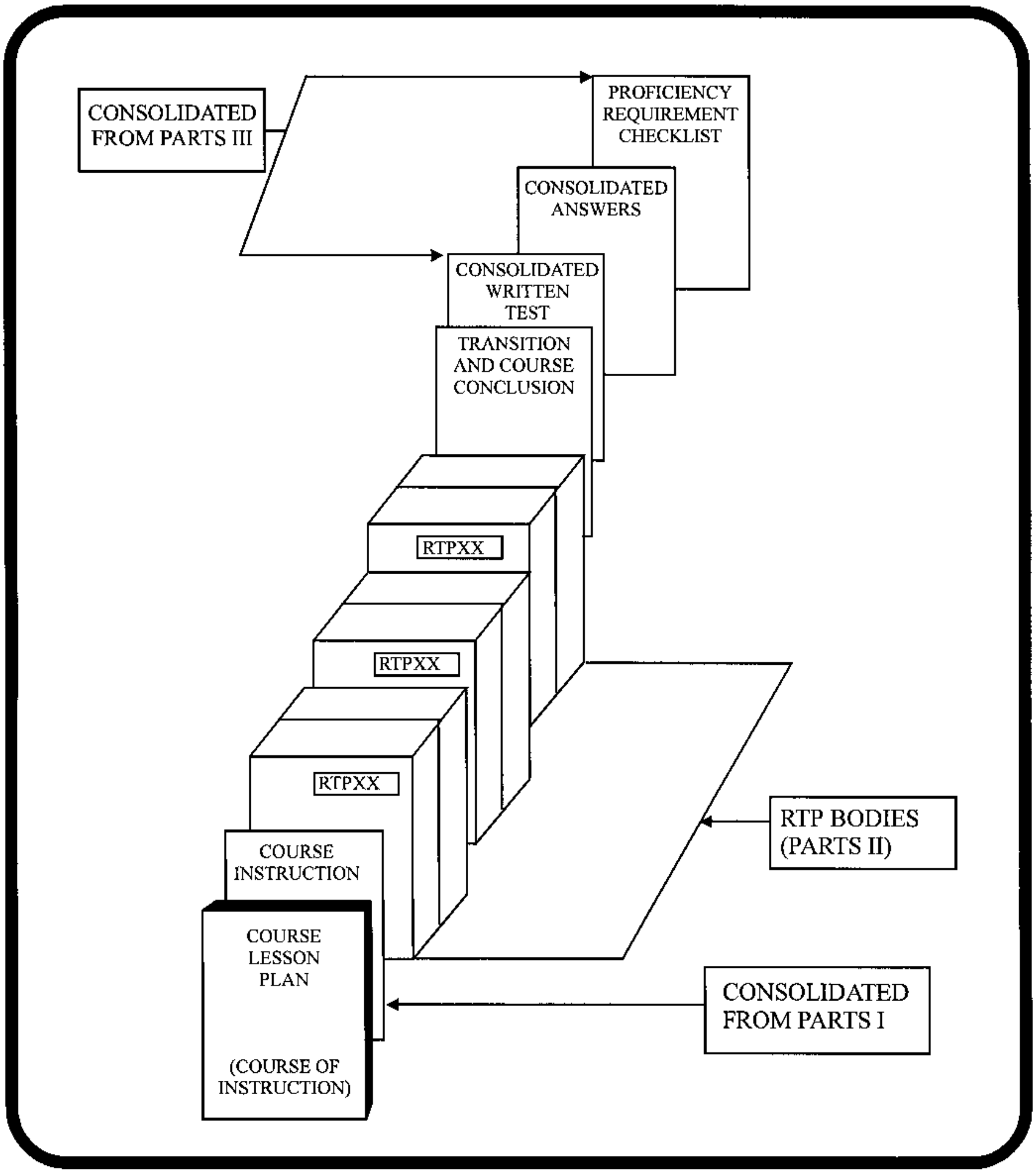
A5.7. Conduct Training. Review the lesson objectives prior to starting a new block of instruction. Teach the lesson objectives that are needed to accomplish assigned duties. If a person must operate a piece of equipment but the equipment is not on-hand, the instructor may teach the knowledge items and wait until the equipment is available to bring the person to full proficiency (knowledge items and task steps). Review test results with the students. Before giving course credit, ensure each student understands correct responses to questions missed or unanswered. This review may be done individually or in a group.

Table A5.1. Recommended RTPs for Disaster Preparedness Course.

DISASTER PREPAREDNESS COURSES	A Block -General Disaster Preparedness Organization, Responsibilities, and Procedures	B Block - Individual Protective Equipment	C Block - Wartime Threat/ Protective Actions/ Procedures	D Block - Protective Shelters	E Block - Chemical Radiological Detection and Measuring Equipment	F Block - Chemical Decontamination/ Detection Equipment	G Block - Concept of Operations/ Contamination Control/ Decontamination	H Block - Concept of Operations (Peacetime Emergencies)	I Block - Miscellaneous	K Block - Camouflage, Concealment, and Deception (CCD)
NBC Defense Training		B1,B2,B3	C1,C2,C3,C4, C5,C12	D5		F1,F5,F7,F9	G5			K1,K3
Shelter Management Team									I1,I3	
(Nuclear Threat Area)	A1		C1,C4	D1,D3,D7	E2,E5,E6,E7, E8		G3	H5	I1,I3,I4	
(Chemical Threat Area)	A1	B6	C4	D1,D7,D9		F2,F3,F4	G5		I1,I3,I4	K1,K4,K7
(Natural Disasters)	A1			D1,D10				H2	I1,I3,	
Disaster Preparedness Support Team										
(NBCC Threat Area)	A1,A2,A4	B6	C4	D9	E1,E2,E3,E4, E5,E8	F2,F3,F4,F6,F8	G1,G2,G3,G4	H2,H3,H5	I1,I2.I3,I4	K1 thru K11
(Non-threat Area)	A1,A2,A4	B1,B2, B6			E1,E2,E3,E4, E5,E6,E7,E8		G1,G3,G4	H2,H3,H5	I1,I3,I4,I6	
Contamination Control Team										
(Nuclear Threat Area)	A1	B1,B2,B5			E1,E2,E4,E5, E8	F6,F8	G3		I1,I4	
(Chemical Threat Area)	A1	B1,B2,B5, B6		D9		F2,F4,F6,F8	G2		I1,I4	K4,K10
(Major Accident)	A1	B1,B2,B5			E1,E2,E4,E5, E8	F6,F8	G4		I1,I4	
Unit Disaster Preparedness Representative	A1,A2,A3							H1,H2,H3		K1

Disaster Control Group	A1,A2,A4							H1,H2,H3,H4	I1,I3	
Exercise Evaluation Team	A1,A5									
Camouflage, Concealment, and Deception (CCD Planner) (CCD Trainer) (CCD User)										*Applicable to the threat K1 thru K11 K1,K2,K3, K4,K5,*K6 - K10 *K4,K6,K7,K8,K9, K10
Base Emergency Preparedness Orientation			C1,C4,C5					H1,H2,H3, H5		
Control Center	A1,A2,A6,A7		C4					H1,H2,H3	I1,I3	

Figure A5.1. Sample Course of Instruction.



AUDIOVISUAL PRODUCTS

A6.1. The following is a list of audiovisual products that support the Civil Engineer readiness training. All of these items, unless indicated otherwise, are available through the U.S. Army Visual Information Center (USAVIC) at the address shown below.

USAVIC/JVIA
Attn: ASQV-JVIA-T (USAF)
Bldg #3, Bay #3, 11 Midway Road
Tobyhanna, PA. 18466-5102

A6.2. At the end of this document is a **KEY** explaining the code used. Also included is a list showing programs that are currently under development. Current lists of these products are published periodically in *The Civil Engineer.*

A6.3. Air Force Video Programs:

CODE	PIN #	PROGRAM TITLE
c	27643	Desert Survival (1979)
c	30790	Camouflage, Cover & Concealment (Part I)
c	30573	Camouflage, Cover & Concealment (Part II)
	33298	Use of M256 Chemical Agent Detector Kit (1980)
	38404	CW--Operating in a Toxic Environment (1977)
	38645	The Law of Armed Conflict (1978)
c	50586	Tent Erection/GP Medium--16' x 32' (1978)
c	51365	Desert Survival (1979)
c	51736	Cold Facts (1980)
c	52624	Hardback Construction--16' x 32' (1980
c	53214	Hardback Construction--18' x 52' (1982)
c	53222	Bomb Damage Repair (1982)
	504361	CPR for Bystanders--Commercial Production (1987)
	504443	Medical Threat in SWA & Africa (1986)
	601F90VC	Arctic Survival (Production Date Unk)
c	602228	ROWPU Operation & Servicing (1989)
c	602413	Constructing Fighting Positions, Part I (1983)
c	602414	Constructing Fighting Positions, Part II (1983)
c	602720	Field Sanitation & Hygiene
c	604076	Disaster Preparedness (DP) Base Population Training
	604372	9mm Pistol--General Operating Procedure (1986)
	604373	9mm Pistol--Detail Disassembly (1985)
c	604725	Hardening of Critical Facilities & Utilities (1986)
c	604726	Bare Base Layout (1986)
c	604727	Military Sanitation (Two Part Program--1987)
c	604728	Base Denial (1987)
c	605944	Bare Base Conceptual Planning (1987)
c	605946	Bare Base Site Specific Planning (1987)
	606035	Survive to Operate (CW) (1989)
	606038	Wartime Threat/Protective Actions/Procedures (1989)
	606039	Protective Shelters (1989)
	606041	Individual Protective Equipment (1989)
	606042	Chemical DECON/Detection Equipment (1989)
	606047	Concept of Ops for Contamination Control/DECON (1989)
c	606726	PACAF Utility Systems (1988)
	607650	The Civil Engineering Commitment (Production Date Unk)
	608185	Mobile Aircraft Arresting System--MAAS (1989)

c	608408	Explosive Ordnance Reconnaissance, Part I (1989)
c	608409	Explosive Ordnance Reconnaissance, Part II (1989)
	608542	Maj Gen Brakins CCD Comments (1988)
	608660	Explosive Ordnance Reconnaissance (EOR) (1988)
	609329	Rapid Runway Repair Concrete Slab (1989)
c	609565	Introduction to Auxiliary Firefighting (1990)
	609613	Officer Field Education (1989)
	609930	Prime BEEF Wartime C^2 (1991)
c	609978	Introduction to Resource Dispersal (1990)
	610384	An Overview of the RRR Process (1991)
	610619	Introduction to Fiberglass Mat Repair (1991)
	610675	Self Aid & Buddy Care Training (1991)
	610735	Intro. to the AM-2 Method of RRR (1991)
	611348	Intro. to Airfield Spall Repair (1992)
	611404	The POL Pipeline RURK (1992)
c	611433	Prime BEEF Expedient Construction (1991)
	611902	Folded Fiberglass Mat Procedures (1993)
	611928	Prime BEEF Orientation -- (Repl of 609017)(1994)
	611954	Crushed Stone Crater Repair (1993)
	612060	Harvest Eagle Water System (1994)
	612076	Harvest Eagle Electrical System (1994)
	612088	Intro. to the MK-1 Remote Wrench (1993)
	612269	Convoy Procedures (1994)
	612362	Harvest Falcon Bare Base Systems Overview (1994)
	612404	Harvest Eagle Program Overview (1994)
	612480	Expandable Shelter Container (ES/C) (1994)
	612481	Bare Base General Purpose (GP) Shelter (1994)
	612617	TEMPER Tent (1994)

A6.4. Video Productions Currently Under Development:

PIN #	PROGRAM TITLE
611447	Harvest Falcon Water System
612665	Engineer Doctrine
612714	EOD Overview
612819	Disaster Preparedness Overview
612838	Emergency Airfield Lighting System (EALS)
612853	Deployable Pavement Repair System (DPRS)
612895	Small Crater Capping Procedure
612902	Munitions Clearance Vehicle (M-60 Tank)
	Camouflage, Concealment & Deception (CCD)
	Harvest Eagle Mechanical Systems
	Harvest Falcon Electrical System

KEY:
c Slide-Tape Programs Converted to Video Format

LEADERSHIP TRAINING WORK CENTER SUGGESTIONS

A7.1. Concept. Construction projects provide invaluable opportunities for junior officers and NCOs to gain leadership experience and for airmen to develop their skills. We can make this happen by forming a short term construction "company" which includes a junior officer, NCOs, and airmen and giving them a challenging project to complete. You can even have more than one team working on different projects at the same time. We suggest staggered construction starts in that event.

A7.2. Project Scope. New construction, facility renovation, or major repair projects are always good candidates. Keep the project moderate in scope. We suggest projects with construction periods from 2 to 3 months. Larger projects, which can be divided into distinct phases with a different team assigned to each phase, also work. A project should involve as many building trades as possible.

A7.3. Project Limits. Even though this is primarily a training effort, you must adhere to the programming rules and project limitations. The team leader must know the project cost limits and monitor the cost reports.

A7.4. Team Involvement. When possible, the team should work the project from the beginning. Have them work with the customer; design the project or manage its design by others; develop the materials list; work with material control and contracting to order the items; identify the craftsmen and equipment required; prepare a construction schedule; run digging permits and other project paperwork to learn the flow; and, finally, do the work. The degree of involvement can vary between teams. You may want some teams only to construct the project as designed by others. Experience and talents of team members, nature and scope of the project, and required completion date all play in that decision. Generally, a less experienced team needs to be more involved to learn the steps.

A7.5. Team Composition. Initially you only need to select the officer and one or two NCOs. Give them their task. Encourage them to talk with anyone they need and especially others who have gone before to get ideas for developing their game plan. If they need design help, they have to arrange support from the Engineering Flight chief. After the design is complete and until the materials arrive, the project will be a part-time effort for the team leaders. During that period, the team leaders need to track material status, resolve problems, and schedule construction when the materials are on-hand. When construction is set to begin, add 10-20 airmen with the needed specialties to the team. The team composition should remain fixed so that people will have to help each other without regard to specialty to get the job done. When special skills are needed, craftsmen can be loaned to this work center. On subsequent projects, try not to use the same airmen. Other airmen need and deserve this experience also. Some skills such as engineering technicians, power production specialists, and liquid fuel systems maintenance specialists might not be required very often. You can still involve them to fill laborer positions.

A7.6. Operate as a Work Center. The team should operate as a work center. The team chief should report to the Operations Flight chief or the Heavy Repair Element chief. They need to prepare at least some of the paperwork, perform labor reporting, and be involved in scheduling meetings. In the process, they learn first hand how a base civil engineer unit operates. When the project is done, the team officer and NCOs need to prepare EPR inputs or Letters of Evaluation for the team members.

A7.7. Work Schedule. As construction is about to begin, have the team set its target completion date. That date should challenge them and also meet the customer's need. If practical, let them set their own work hours. One ground rule is their hours can't interfere with other base activities. For example, they should not schedule noisy work near dormitories, housing areas, or chapels on Sunday mornings just because it's convenient for the team. They also shouldn't expect support from others during non-standard duty hours, unless the other shop is willing.

A7.8. Equipment. The team needs equipment. Give them exclusive use of at least one vehicle. The leaders should identify their need for special purpose equipment early and work out a non-interference schedule to borrow those items from the owning shop. While it would be ideal for team members to operate all equipment, the team will have to settle for support from the owning shops if no one is qualified. The challenge is for the team leaders to recognize the need early and get their people qualified.

A7.9. Controls Over Work. Some controls are required. Mistakes will happen. That's not all bad, because the team will learn from those mistakes. You just don't want the mistakes costing a lot of time and money. You need to include progress reviews to make problems visible early so the team can learn and do something about them. Designs should be reviewed and approved with the same degree of scrutiny as any similar type base project. Have qualified craftsmen periodically look after the team to verify the job conforms to codes, especially the National Electric Codes and the Life Safety Codes of the National Fire Protection Association, and to ensure the team is using good safety practices. Have the team leader periodically brief project status, just for the practice if for no other reason. However, if the project is time sensitive or highly visible, the commander needs to know how it is progressing. The briefing should cover status versus schedule, explanations for any delay, anticipated problems, and proposed get well actions.

A7.10. Readiness Training Tasks. You can also task the team to complete selected readiness training requirements in addition to the project. Be sure to adjust the project schedule to accommodate such additions. Physical conditioning as a team should be encouraged.

A7.11. Unit Support. This effort will impact other work centers on a continuing basis. Brief the entire unit on the concept before you start it. Work with the work center foremen in advance. When they understand the purpose and the value, they will have an easier time giving their unqualified support, loaning equipment, and picking good and deserving airmen and NCOs to get the experience. Encourage their suggestions on how to make the program run smoother at your base.

A7.12. Other Benefits. Besides the leadership experience, the training work center offers other benefits. The leaders develop organizational skills, learn first hand how a work center and the unit are run, gain experience in getting resources, develop design skills, learn project management, get construction experience, and have the opportunity to develop a good officer-NCO bond.

A7.13. Timing. Get your junior officers and NCOs involved before they have been on station 2 to 3 years, and certainly before they start getting ripe for reassignment. You want them to be able to complete their project. And the sooner they get this experience, the sooner they will be better leaders. Nothing prevents you from allowing an officer or NCO do this more than once.

SILVER FLAG CURRICULUM (BY AFS)

A8.1. 32EX/3E000--COMMAND AND CONTROL

- Operate CMC (formerly SRC)
- Operate DCC
- Damage Plotting
- Selecting MAOS
- Beddown Planning
- Calculate RQC
- Damage Assessment
- Predeployment Preparations
- Rapid Runway Repair

A8.2. 3E0X1--ELECTRICAL SYSTEMS

Contingency Electrical Systems

- Install MAAS
- Set Up/Operate Airfield Lighting Set
- Set Up/Operate Bare Base Electrical Distribution System

A8.3. 3E0X2--POWER PRODUCTION

Contingency Electrical Systems

- Set Up/Operate 750 kW Generators (MEP-12) System
- Install MAAS
- Layout Bare Base Electrical Distribution System

A8.4. 3E1X1--HEATING, VENTILATION, AIR CONDITIONING, AND REFRIGERATION

Contingency Mechanical Systems

- Set Up/Operate M-80 Boiler
- Set Up/Operate Mobile Water Chiller
- Perform Decontamination Operations
- Set Up/Operate 150-CF Refrigeration Unit
- Install Harvest Falcon Air Conditioner
- Maintain Bare Base Laundry Unit

RRR Operations

- Assemble AM-2 Patch
- Repair Spalls

Contingency Facilities

- Erect GP Shelter
- Erect ESC Shelter
- Erect Temper Tent

A8.5. 3E2X1--PAVEMENT/EQUIPMENT OPERATIONS

RRR Operations

- Repair Crater with Fiberglass Mat Cover
- Repair Crater with Concrete Slab Cover
- Operate Concrete Saw
- Install Folded Fiberglass Mat
- Crater Profile Measurement
- Crater Squaring

A8.6. 3E3X1--STRUCTURES

Contingency Facilities

- Erect GP Shelter
- Erect ESC Shelter
- Erect B-1 Revetment
- Erect TEMPER Tent

RRR Operations

- Stripe MOS
- Install Folded Fiberglass Mat
- Repair Crater with Fiberglass Mat Cover
- Operate Concrete Saw

A8.7. 3E4X1--UTILITIES

Contingency Water Systems

- Set Up/Operate BB Water Distribution and Wastewater
- Collection Systems
- Set Up/Operate HF Shower/Shave Unit
- Set Up/Operate ROWPU
- Set Up/Operate HF Field Deployable Latrine
- Operate POL RURK

A8.8. 3E4X2--LIQUID FUEL SYSTEMS MAINTENANCE

Contingency Water Systems

- Set Up/Operate Bare Base Water Distribution and Wastewater Collection Systems
- Operate POL RURK
- Set Up/Operate Harvest Falcon Field Deployable Latrine
- Set Up/Operate Harvest Falcon Shower/Shave Unit

A8.9. 3E5X1--ENGINEERING

RRR Operations

- Damage Assessment
- Damage Plotting
- Selecting MAOS
- Calculate RQC
- Layout MAOS
- Crater Profile Measurement
- Repair Crater with Fiberglass Mat Cover
- Crater Squaring
- Install Folded Fiberglass Mat
- Operate Global Positioning System

Contingency Facilities

- Beddown Support

A8.10 3E6X1--OPERATIONS

RRR Operations

- Damage Plotting
- Select MAOS
- Damage Assessment

Command & Control

- Operate CMC (formerly SRC)
- Operate DCC
- Preattack Preparations
- Supply Support

Contingency Facilities

- Erect ESC Shelter
- Beddown Planning

Chemical Warfare Defense Operations

- NBC CONOPS

A8.11. 3E7X1--FIRE PROTECTION

Contingency Fire Protection Operations

- P-19B Operations
- Aircraft Egress Operations
- Aircraft Live Fire Operations
- Mobile Aircraft Arresting System (MAAS) Operations
- Hi-Pack Compressor/AD800 Operation
- Search and Rescue Operations
- Firefighting Concept of Operations

- Firefighting Exercise
- Wartime Simulation Computer

A8.12. 3E8X1--EXPLOSIVE ORDNANCE DISPOSAL

Contingency EOD Operations

- Damage Assessment
- Operate M-60 Ordnance Clearing Vehicle
- Operate Stand-Off Munitions Disrupters (SMUDS)
- Operate Survival Recovery Center
- Operate Global Positioning System
- Operate Armored Reconnaissance Vehicle
- Chemical, IED, and Conventional Operations

A8.13. 3E9X1--READINESS

Chemical Warfare Defense Operations

- Plot/Assess NBC Hazards
- Operate Detection Equipment
- Operate Smoke Generator
- Perform Reconnaissance Team Operations
- Operate Collective Protection System and Contamination Control Area
- Operate CMC/NBC Cell
- Operate Global Positioning System
- Plan and Erect Camouflage, Concealment, and Deception (CCD) Equipment

SUBJECT INDEX

-A-

-B-

-C-

-D-

-Q-

-R-

8

-T-